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THE COMPOSITION OF SOME ANCIENT BRONZE IN THE DAWN OF THE ART OF METALLURGY

By GEORGE BRINTON PHILLIPS

THE antiquity of bronze is still in doubt. In Babylonia, lance heads of metal date back probably to 4000 B. C., and a tablet of Entregal, King of Lagash, 3100 B. C., records "so many manas of bronze" paid for some land, but the "bronze" may have been only copper. In Egypt, the bronze red from Medun dates back to 3700 B. C., and the metal statue of Pepe I, VIth Dynasty, of hammered plates shows great knowledge of the metal worker's art. Venerable China has a claim that in the Shang Dynasty, 1783 B. C., bronze working had reached an advanced stage. Since southern China produced copper and tin in abundance and the opportunity for experimenting was good, the claim of China may be considered admissible. Egyptian tablets, however, record expeditions sent by their early kings to Sinai to obtain copper from the mines there, and tin was doubtless obtained from the Phoenician traders, who brought it from the British Isles, where it was mined 3000 years ago, and exchanged it for Egyptian products. The ancient Assyrians obtained copper from Arabia and Cyprus and tin from India and Spain, and it is quite possible that the ancient metallurgists mixed these two metals in certain proportions to obtain their alloys, although in some cases the ores themselves may have been melted together giving bronzes differing in their composition. Certain inferences may be drawn from these analyses of bronze. Egyptian bronze showed a varying composition. Where a hard cutting edge was not required lead was substituted for tin; a moderate amount of tin was used where stiffness was needed and in cast bronze where a sharp impression was necessary. Arsenic and antimony, found in certain bronze, may have had a hardening

effect and possibly represents accidental impurities in the copper ores. The lead present in some Egyptian bronze may have come from the lead mines near Laurium on the eastern coast of Greece and no doubt was substituted for the tin for economy. The Egyptians, having copper, tin and lead, could have experimented with these metals in order to obtain the best proportions for different purposes. Greek "bronze," where no special qualities were required, proved to be nearly pure copper, while in samples of real bronze the addition of tin suggests that the metallurgists knew of its importance and used it for certain purposes. The bronze from Carthage contained a rather excessive amount of tin, possibly to obtain the best cast results, and as the Phoenicians dealt in tin they had plenty of that metal. The Russian alloy of copper was not a bronze but an alloy of copper and iron, and suggested that the use of tin was unknown, or the tin very difficult to obtain; the presence of iron may have had a hardening effect which a sickle with a cutting edge would have required. The bronze celt from England suggested that, at this early period, the workers in metal may have obtained copper and tin from Cornwall and discovered the best proportions to use in making their tools and weapons. The Korean bronze seems to have been an intentional alloy of copper and tin, and the spoon showed knowledge of the metallurgist's art. The Japanese and Chinese bronze mirrors showed a certain similarity of composition: the Chinese being more ancient workers in bronze than the Japanese the latter may have imitated their proportions. The Etruscan bronze shows a familiarity with the composition of a true bronze and the Etruscans must have been extensive workers in metals from the large quantity of bronze ornaments, utensils and other objects now exhibited in the Museum at Florence.

Neither North America nor Central America seems to have had a bronze age; objects of metal found of ancient date were of native copper obtained from mines of the north and northwest and hammered into shape.

The following analyses give the composition of specimens of bronze collected by the writer in the various countries visited, with a brief description of the objects. When only a small piece

of the metal could be obtained, the use to which the bronze was put was judged from its general appearance.

Ancient Egyptian Bronze

No. 1. Bronze nail obtained from Dr. Flinders Petrie, discovered in his excavations at Old Memphis, Egypt, among ruins of the Palace of Apries, 26th Dynasty. The nail, which showed but little oxidation on the surface, was 1¾ inches long, tapering from ½ inch to ¼ inch in thickness, with rounded point and no head, composition as follows:

	per cent
Copper	74.62
Tin	.88
Lead	21.32
Iron	.34
	97.16

This nail was not a true bronze, containing, as it did, only a small amount of tin, but what was called "pot metal," an alloy of copper and lead used in prehistoric times for small objects and filling weights, and it is rather surprising to find this alloy in a nail, where some rigidity was required.

The accompanying microphotograph (Fig. 7) shows the alloy of copper to be supersaturated with lead. The dark portions are lead and the lighter ones the copper alloy.

No. 2. Specimen of bronze obtained by Dr. Petrie in his excavations at the Palace of Apries, 26th Dynasty. A fragment of cast bronze, flat piece ⅝ inch thick.

Composition	per cent
Copper	92.00
Tin	6.52
Lead	.82
Iron	.28
	99.62

A true bronze with minimum amount of tin. Lead and iron were probably impurities in the ore.

No. 3. Obtained from a reliable curio dealer in Egypt who

stated the specimen was found in the Pyramid of Illahun on the Fayum, 12th Dynasty.

Cast hollow handle, possibly a utensil or weapon.

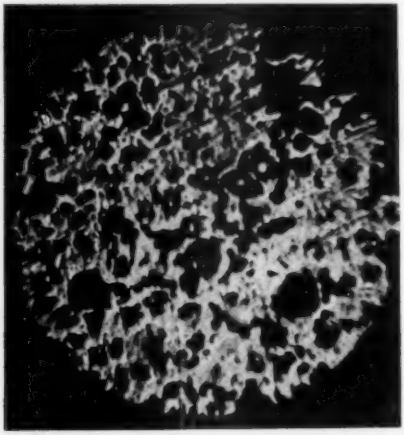


FIG. 7.—Microphotograph of "bronze" nail from the palace of Apries, Old Memphis, Egypt, containing an alloy of copper and lead; enlarged 75 diameters. (No. 1.)

Composition	per cent
Copper	73.66
Tin	4.78
Lead	19.25
Cobalt	.81
Iron	.19
	98.69

This alloy showed an economy in tin and a large proportion of lead. The cobalt and iron were doubtless impurities in the ore.

No. 4. Obtained from Mohassib, a well informed curio dealer at Luxor. The specimen (Pl. I, a) was a small paddle shaped tool 2¾ inches long and ⅛ inch thick, found at Thebes near the Ramesseum, 12th Dynasty. Surface oxidized.

a

b

c

d

ANCIENT BRONZES

a. Egyptian bronze from Thebes (No. 4 in text); b. Greek bronze ax head from Taormina, Sicily (No. 10 in text); c. Bronze celt from Pickering, England (No. 16 in text); d. Russian "bronze" handle of sickle (No. 15 in text).

Composition	per cent
Copper	88.95
Tin	.16
Antimony	.68
Arsenic	5.60
Lead	.65
Tin	.32
	96.36

This alloy was deficient in tin. Hardness was insured by the presence of antimony and arsenic which occur in copper ores from Cornwall, Saxony, and other localities.

No. 5. The fragment of a bronze bowl from Luxor, 11th Dynasty, obtained from the Museum in Cairo.

Composition	per cent
Copper	85.83
Tin	3.51
Lead	8.50
Iron	.24
	98.08

In this alloy there is an economy in tin and a substitution of lead. The thinness of the metal suggested it had been hammered out.

Greek Bronze

No. 6. This specimen was obtained from Dr. Stais, Director of the Museum at Athens, Greece. It was thin sheet metal probably from a bowl or vessel from Dr. Schliemann's tombs at Mycenae, date 1500 B. C.

Composition	per cent
Copper	99.38
Lead	.17
Arsenic	.19
	99.74

Almost pure copper; lead and arsenic impurities in the ore.

No. 7. A specimen of Greek bronze; same source and date

as the above. Metal ⅛ inch thick, enclosed in an outer coating of metal—possibly a sword handle.

Composition	per cent
Copper	99.37
Tin	.10
	99.47

Nearly pure copper, the small amount of tin probably an accidental impurity.

No. 8. A fragment of Greek bronze from the Acropolis of Athens, date 520 B. C., obtained from the Museum. Cast metal, thick and of irregular shape.

Composition	per cent
Copper	88.07
Tin	9.66
Lead	.30
	98.03

True bronze, the tin present giving hardness suitable for tools or other purposes.

No. 9. Thin plate, probably a utensil, obtained from Dr. Stais of the Athens Museum, Schliemann's tombs, Mycenae.

Composition	per cent
Copper	95.63
Tin	.07
Iron	.87
Phosphorus	.14
	96.71

This metal, found with the bones of a burial, may have combined with the phosphorus in the bones causing an accidental impurity.

No. 10, Greek Bronze from Taormina. Portion of an ax head (Pl. I, b), said to date from about 600 B. C. Wedge shaped piece ½ inch thick at back where broken off, cutting edge 3 inches across the face, which was somewhat broken and worn; the sur-

face was pitted and covered with a layer of green carbonate of copper.

Composition	per cent
Copper	90.28
Tin	7.31
Lead	.19
Zinc	.17
Iron	.48
	98.43

This specimen seemed to be a real bronze, although the presence of zinc in the alloy is unusual. Having been purchased at a curio shop, the authenticity is somewhat doubtful.

No. 11, Silver Alloy from Greece. A piece of thin silver, portion of a vase or ornament from Schliemann's tombs at Mycenae, obtained from Dr. Stais of the Athens Museum. It was covered with a scale which was detached and analyzed separately.

Composition of the Clean Metal	per cent
Silver	95.88
Copper	3.48
Gold	.43
	99.79

No. 12, Scale on Silver Alloy from Greece.

Composition of the Scale	per cent
Silver Chloride	42.80
Silver Oxide	44.80
Copper Oxide	10.40
Gold	.40
Moisture	1.60
	100.00

The composition of this alloy was remarkable from the fact that it might have contained more copper without affecting its brilliancy, and the presence of sufficient gold to have made it profitable to have separated the gold from the silver had these ancient metal workers known how to "part it." This composition

suggests that they may have obtained the alloy from smelting some ores containing these metals without knowing much about the composition.

Phoenician Bronze

No. 13. A bronze mirror obtained at the Museum at Carthage, round, 3¾ inches in diameter, with no handle, differing in this respect from the Roman mirrors found at Carthage. Age uncertain, but the fact that it was greatly corroded, covered with a brown oxidation, and very brittle, suggests it might have come from the Old Punic Cemetery, the Necropolis of St. Louis, dating from about the 5th Century B. C.

Composition	per cent
Copper	82.00
Tin	14.36
Iron	.63
	96.99

Owing to the oxidation it was not possible to obtain a sample of clean metal for analysis. The proportion of tin shows an unnecessary amount of this metal.

Bronze from Ceylon

No. 14. A bronze begging bowl given the writer by Dr. Joseph Pearson, Director of the Colombo Museum, unearthed at Polonnaruwa, Central Province of Ceylon, and believed to belong to the 12th Century, A. D. It was 6 inches in diameter, the bottom entirely gone; the rim was about 1/16 to ⅛ inch thick and had the appearance of being cast.

Composition	per cent
Copper	77.46
Tin	19.63
Lead	.19
Cobalt	.43
	97.71

The large amount of tin may have been given for hardness and durability; the lead and cobalt are doubtless impurities.

Russian Bronze

No. 15. When at Moscow, a bronze sickle was taken from a case in the Imperial Museum by the Director, Prince N. Steherbatoff, and given to the writer for analysis. It was only the handle, the blade having been broken off, and was of the Siberian type from the government of Saratow, central Russia, the date being 1500 to 1700 B. C. The handle was 3 inches long, from 1¾ to 2¼ inches wide, and ⅛ inch thick, reinforced with a stout iron rim on one side, and was evidently cast (Pl. I, d).

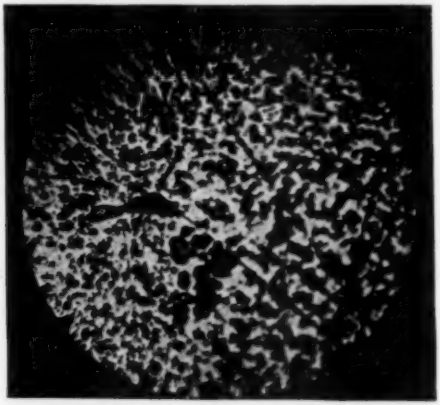


Fig. 8.—Microphotograph of Russian "bronze" sickle containing an alloy of copper and iron; enlarged 75 diameters. (No. 15.)

Composition	per cent
Copper	91.55
Iron	6.22
Cobalt	.30
	98.07

This alloy is remarkable from the fact that it contained no tin and a larger amount of iron than is found as an impurity in alloys, suggesting that the copper may have been reduced from a mixture of copper ores containing considerable iron.

The accompanying microphotograph (Fig. 8) shows the peculiar structure of this alloy.

Bronze Celt from England

No. 16. James M. Mitchelson, Esquire, of Pickering, England, unearthed, in a round barrow in the hills above the Vale of Pickering, many prehistoric relics, stone implements, incense cups, food vessels, etc., and roughly cast bronze celts, which he assigned to the early bronze period, 1800 to 1500 B. C. He was kind enough to give the writer one of these celts from his private museum for analysis.

Socketed celt, with square socket, a loop on one side but no ornamentation (Pl. I, c).

Composition	per cent
Copper	83.80
Tin	10.18
Lead	5.31
Iron	.41
	99.70

Korean Bronze

No. 17. From the museum at Seoul, Korea, a bronze spoon was obtained, said to have come from an ancient grave at Songdo, date 900 to 1400 A. D. It was well shaped, with a curved handle like a soup ladle, and was stiff and rigid. The metal was coated with a thin patina of a pale green color, and when cleaned had a whitish red appearance.

Composition	per cent
Copper	77.25
Tin	21.54
Lead	.02
Iron	.70
	99.51

The amount of tin in this alloy seems excessive but was probably used to secure hardness and rigidity. Copper was mined at Kapsan, Korea, and was smelted in a "hole in the ground process" until recent times.

ANCIENT BRONZES

Above Japanese bronze mirror of the Ashi Kaga period (No. 18 in text); below Chinese bronze mirror of the period of the Ming Dynasty (No. 19 in text).

Japanese Bronze

No. 18. Mirror bought at Kyoto from a reputable curio dealer, who stated the mirror was of the Ashi Kaga period, and about 600 years old, and that it had been in a fire. The mirror had a crude appearance, with no evidence of a polished surface, the back having rough figures of men and animals raised in high relief above the cast surface. (Pl. II, upper figure.)

Composition	per cent
Copper	73.20
Tin	10.80
Lead	14.50
	98.50

The per cent of tin is the usual amount in true bronze; why the large amount of lead is unknown.

Chinese Bronze

No. 19. Mirror (Pl. II, lower figure) obtained at Canton and probably of the Ming Dynasty (1368–1643). The mirror had three columns of Chinese letters on the back. The reflecting surface had been polished and had a white coating, much worn away; it was examined for silver but proved to be tin. The mirror had no handle, but an ornamental edge.

Composition	per cent
Copper	65.20
Tin	9.72
Lead	23.19
	98.11

No. 20. The figure of a little elephant of rather crude workmanship, from Peking, said to have come from a temple, date uncertain, but said to be 200 years old.

Composition	per cent
Copper	56.60
Tin	.62
Lead	5.73
Zinc	31.99
Iron	4.47
	99.41

This alloy, containing but a very small quantity of tin and nearly 32 per cent of zinc, was not bronze but an ordinary brass.

Bronze from Etruria

No. 21. A specimen of ancient bronze was obtained at Florence from the Director of the Etruscan Museum, Barlozzetti Cesare, R° Museo Archeologico Firenze, found in one of the tombs at Populonia Piombino, date 3rd or 4th Century B. C.

The metal was very thin, evidently beaten out, and was probably some portion of a vessel or utensil.

Composition	per cent
Copper	84.28
Tin	10.28
Lead	None
Zinc	None
Iron	None
Phosphorus	Trace
	94.56

Owing to the specimen being very thin and covered with a green scale, it was impossible to get a fair sample. Clean metal would probably have shown a true bronze with 90 per cent copper and 10 per cent tin. The absence of any trace of iron is rather unusual in ancient bronze. The presence of a trace of phosphorus in the bronze may be accounted for when associated with an ancient burial.

Bronze from Yucatan

No. 22. A small globular-shaped bell about 5/8 inch in diameter and 3/4 inch long found with a number of others in a jar with inscribed characters buried in a mound near the village of Humebchin, Yucatan, yielded on analysis:

	per cent
Copper	97.00
Tin	.34
Lead	1.00
Iron	.07
	98.41

Of course this was not a true bronze; the small amount of tin, lead, and iron may be regarded as impurities in the ore. Central America, in spite of the advanced civilization of the Maya race, does not seem to have reached the Bronze Age.

Bronze from Crete

No. 23. A small fragment of bronze from Crete, so badly oxidized that no clean metal could be obtained, gave an analysis:

	per cent
Copper	68.44
Tin	13.47
Iron	.05
Lead	Trace
	81.96

The results obtained simply showed the use of tin in generous proportions in the bronze alloy.

Tibetan Bronze

No. 24. A curious mask-like bronze head obtained at Darjeeling, said to have come from Tibet, of no particular date. It was about four inches across the face, and had a wide-open, capacious mouth, for the purpose of preserving the ashes of a Lama, or priest. The addition of horns on the head and strange ornamentations gave it a grotesque appearance.

Composition

	per cent
Copper	83.78
Zinc	15.00
Iron	1.30
Tin	None
	100.08

As this alloy contained no tin, it could not be considered a bronze, but rather an ordinary brass, and probably quite modern.

The specimen, while it claimed no interest as an alloy of copper and tin, or bronze, displayed considerable skill in the casting, and seems to have been treated so as to give it the reddish-brown appearance of a "bronze." The clean metal itself had the

reddish look of a copper and tin alloy, and not the yellow tint of a copper and zinc brass.

Bronze from South America

Objects in metal of ancient manufacture in Peru show that some portions of South America at least passed through a "Bronze Age." Specimens of prehistoric bronze from Machu Picchu when analyzed gave interesting results. The analysis in a paper by Dr. C. H. Mathewson gives the following composition in percentages:

	Copper	Tin	Iron	Zinc
A. Knife	94.26	4.82	0.28	.....
B. "	96.79	3.00	None	.....
C. "	95.35	4.22	None	.....
D. "	96.79	3.00	None	.....
Chisel	96.20	3.71	None	.....
Ax head	93.70	5.01	None	.....
Ornamented spatula-shaped piece	86.03	13.45	.....	0.32
Irregular-shaped piece	95.68	4.20	.....	.....
Mirror with handle	94.35	5.34	.....	.....

Mr. W. A. Wesslin's analyses of bronze from South America gave the following results:

	Tin
Knives, chisels, and ax heads requiring hardness and strength	5.00–10.00
Tools from Bolivia	2.00–10.00
Pins from Bolivia	1.00–10.00
Clamps and some other objects from Bolivia	little if any
Ornamental figures and bolos from Bolivia	nearly 10.00
Objects from Cuzco, such as knives, chisels, and ax heads	3.87– 8.53
Ornamental figures from Cuzco	1.97– 8.54
Bronze objects found in the ruins of Tiahuanaco gave	
For cutting tools	3.27– 7.79
For ornaments	1.28–10.59

(The tin in bronze cutting tools from South America seems to range from 3.00 to 8.00 per cent minimum amount, while ornamental objects contained from 8.00 to 10.00 per cent tin, a rather excessive amount.)

The Bingham expedition of 1912 in Peru found at Machu Picchu, not only many specimens of bronze tools and implements, but a large mass of pure metallic tin, showing that the Inca metallurgists were familiar with tin and knew how to obtain it by smelt-

ing the cassiterite ore found associated with copper in the lodes in Bolivia.

When native copper could be found, and tin obtained from the easily reduced cassiterite ore, it is not surprising that experiments should have been made in melting these two metals together in different proportions, and that the Incas should have discovered that a certain amount of tin produced hardness, and the best results in casting, and that a minimum amount of tin, with forging, annealing and cold working, yielded a suitable alloy for tools. This would explain a certain uniformity of composition in tools and objects which would not be obtained by smelting ores of unknown composition, yielding a metal of a varying, accidental and uncertain nature, although it is quite probable a bronze may have been obtained by smelting together ores containing both copper and tin when the metals themselves were not obtainable.

In conclusion I desire to acknowledge the valuable assistance of Dr. D. L. Wallace of the Chemical Department of the University of Pennsylvania, who aided me in my analyses and determinations of compounds in some of the ancient bronzes. The microphotographs were made at the Laboratory of Physics of the University.

PHILADELPHIA, PA.

NEW PHASES IN THE STUDY OF PRIMITIVE MUSIC

By HELEN H. ROBERTS

WHEN we attempt to study art, or especially to describe an art to those unfamiliar with it, we find that, while it is comparatively easy to discuss colors, materials, and subjects, a brief and satisfactory characterization of its style is exceedingly difficult of accomplishment. Yet it is this very style that so completely distinguishes the work of one artist or group from that of another, much more than employment of pigments or other materials, or subjects chosen for expression. Exactly the same condition exists in music. All the arts have certain features in common, in that they are supplied at the outset by nature with certain working materials and it is quite possible that over wide areas the same or very similar elements may be encountered. But it is the way in which the artists play with the material that is furnished that gives us the styles, and it seems to me that the most important of the plays is not the selection from the mass of materials of those which the artist favors, for usually all that are available are chosen at one time or another, but the patterns or designs that the artist creates from them.

When local styles become sufficiently fashionable and fixed they form types. They may be the result of the acceptance by many of sudden departures from other types (and I think this fact is not often taken sufficiently into consideration), or they may mark the gradual accumulation of lesser divergences. This whole question of the growth of variants and the determinants of the beginnings of new styles, while recognized as important by many thoughtful students, has not, for lack of time and sufficient material from which to draw, been as yet adequately studied. Nor do we always detect the influence of religion upon art-endeavor, which has too often resulted in its marked restraint or warping, a fact not only evident in primitive arts, but even in classical arts and in that of Christianity.

Strange as it may seem, considering the prominence given by anthropologists to architecture, the plastic and graphic arts, textiles, and language, in their effort to learn of other peoples, very little systematic attention has been paid to music. Perhaps it is the most important of all the arts when it comes to revealing the history of our forerunners on this continent, since it combines direct subjective evidence of the words with the objective features of its structural designs.

In the western hemisphere most primitive music is vocal. Songs are far more important in every way as anthropological studies than instrumental music. Possibly the Indian's respect for tradition is greater than that of the American Negro, for instance, so that greater stability of songs is maintained over long periods of time. Particularly, melodic and singable tunes will survive many generations, modified, it is true, because the tendency to variation is always active, especially with people who depend solely upon memory for repetition and transmission. This variation grows with the passage of time and the number of intermediaries. So far as my experience with Indian singers goes, it has brought me to the conclusion that while a greater attempt is made to reproduce the songs exactly, and they are on the whole valued more highly than with the Negro, nevertheless there is still considerable tendency toward variation. Beyond the Indian field, even in cases where the variation is great, as with the Negroes, a song long retains enough of its identity to be recognized because of its larger stylistic features, or perhaps its more marked ones.

In song and ritual are hidden archaic forms of language, which may have been obsolete for centuries in the spoken tongue. Where, but in song, ritual, or tales would we find expression of the innermost thoughts of the people, inadvertent references to the minute details of daily life, the expression of religious beliefs, preserved in a form which is more or less stable throughout long periods, combined as in song with an art form which may afford material for comparative purposes?

We may observe the effect of music upon language and vice versa, if we also know the spoken tongue, and where the music has attained something of a formal character because it is appre-

ciated for its own sake, interactions between the two within the songs themselves afford very interesting study. At times the music is woven almost inextricably with the texts, and seems a direct intoned expression of the thought, but quite as often it reveals an appreciation on the part of the composer of its own artistic value and has been developed on its own account. One of the chief values of a study of primitive music lies in the fact that, at least in central North America, it accompanies practically every activity of any significance. Whatever phase of the life of the people we choose to study, we find additional light through the songs which have come to be associated with it. If we would learn of origins, growth, and change in the various institutions as well as their journeying from region to region, we have in the songs not the least useful of our evidence. Any tune is sufficiently complicated to preclude the likelihood of its having been invented twice, especially since the limits of possibility in musical invention are so great, and where instruments play so insignificant a rôle as they do in North America. It is easy to see that instruments of limited range, if used constantly for accompaniments, might affect the development of song.

In Indian music we may observe a great medium of human expression through an utterly different world of thought. From the standpoint of design and structure, as well as of melodic combinations and rhythms, it is in conception markedly and refreshingly different from our own, steeped as it is in rules and precepts so respected, in forms so stilted, or tonal groups so monotonous, that it was not until comparatively recently that composers who infringed the laws laid down by the classicists were accorded more than derision and scorn. Here we must accustom ourselves to new forms and tonal groups, to irregular metres, depending directly upon the accents of the word phrases, as a rule, and thus so simple and natural that we are amazed that we have not seen the beauty of the irregularities before. But the Indians also have rules and canons for certain types of songs, although they may follow them more instinctively than rationally. Not seldom for these the music follows characteristic lines, partly due to the structure of the ritual poetry, and

perhaps these musical types have the most important value for us of any when we are tracing the history of different activities, ceremonies, religious societies and the like.

Miscellaneous songs afford the poorest means of tracing contact because they have usually been inspired by single occasions which have no appeal to others than those actually participating and because they are usually individually, not tribally, owned. They are apt to be borrowed singly, by single individuals, and may become easily lost or difficult of discovery in new surroundings where a collector might not readily divine the circumstances necessary to call them to memory. On the other hand these little single melodies often have great individual charm and are direct expressions of the small incidents in daily life.

Songs which are the property of religious or medicine societies, and which form ritual groups and are sung in their entire cycle with each recurring season or meeting, are always regarded as important by the people themselves, are carefully remembered, and are very often similar in general outline for a given ceremony, in a way which the people themselves recognize even if they do not analyze clearly. Owing to the fact that most tribes have ceremonies which find more or less rough correspondents among other tribes it is easier to find what these are and to draw comparisons between their songs than with miscellaneous songs. Because of a conventional and even holy character, there are likely to be fewer changes in the successive renditions, while an almost universal custom in performing rituals, which consists in much repetition with variation only on significant phrases which mark the steps of the ritual, serves to fix more firmly in mind the form in which the ritual is cast, both as regards tune and words, rendering detection of error in performance more likely. Thus, by means of individual melodies, but, better still, by means of the stylistic features of groups of songs, we may be able to follow the histories of innumerable practices which in tribal life have songs associated with them. Already steps have been made in this direction, limited, it is true, because the collections so far assembled and transcribed are generally of such different types of songs that not many comparable groups are available for study.

We do not perceive the smaller differences in song, however, either in local or tribal types, such as those which characterize different ceremonies, unless they are revealed by analytical study, partly because of the strangeness of the music to our ears, partly because of the subtlety of the art itself, its movement, and its evanescent character. The mechanical means of fixing music were invented rather late in its history in Europe and not at all in many parts of the world, while even now when we have a notation and phonographic records which to a degree permit of audible fixation, to appreciate not only its form but its beauty involves progression and a continual comparison by means of association and memory.

Not only is it difficult to seize upon and designate the peculiarities which distinguish certain types, upon hearing the song, but in reading over the notation they are not all equally clear to a musician, who must needs reduce the music to some simple formulae covering the structure, etc., in order to have them clearly in mind. Such a reduction is even more necessary for those whose unfamiliarity with the symbolism of printed music renders the subject still more complex. For the sake of obtaining the bald outline of the tune and the design which it formed, structurally, it seemed best for the time being in analyzing given songs to eliminate key signatures, musical notes, with their different values, all pitches less than whole step intervals, all measure bars and accents, all expression marks, in fact everything that might be considered to belong to the realm of color in music, much as one might omit questions of technique, color, materials, in basketry, painting, textiles, or pottery in order to see the outline of the decorative designs which cover the surface, only in this instance the designs are the structure itself, the form of the object.

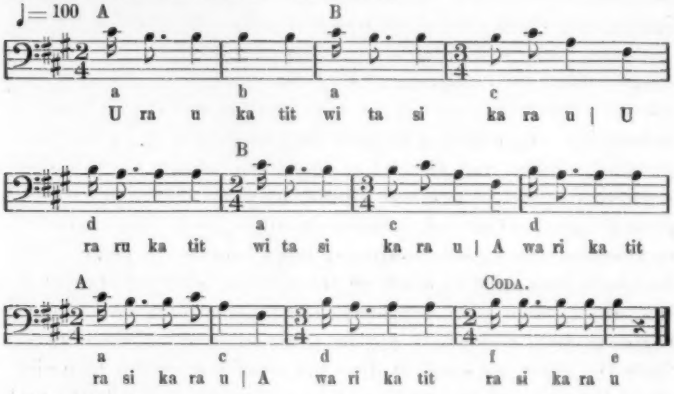
This was accomplished by plotting the tunes on quadrille paper, somewhat after the manner followed by Miss Densmore in her "Teton Sioux Music." The writer received the suggestion from reading her book, but whereas in that study Miss Densmore was interested solely in the trend of the melody, its form of beginning and ending, for which it was sufficient to plot only the first note

of every measure, in the present instance the same device has been made to show the duplication of parts with the aid of letters, their recurrence in different sections of the melody (at times on different octaves with the aid of heavily ruled lines for tonics) as they would be designated in our music. Every beat is represented by a vertical line of the quadrille paper, and except for rests a dot has been placed on the appropriate horizontal line according to the note occurring on the beat in question. No use is made of spaces as in music, but every horizontal line represents a diatonic scale tone, and every eighth one is heavily ruled to represent the tonic. Thus for musicians at least the relation of the tune as a whole to this tonic indicates at once whether it is major or minor in tonality. By means of the plot the tune is reduced to the barest possible outline, and instead of requiring careful reading from beginning to end, as in music, shows at a glance the structure and general plan. The advantages of this quick survey are of inestimable value when comparing large numbers of songs. Letters have been used to mark off the different musical phrases, so that the student need not even stop to see where new phrases begin; in fact, this would not be easily apparent without them. Once the plots are made it does not need a musician to understand the plans of the songs and to see points of similarity and difference in their structure.

One instance of an attempt to study groups of ceremonial songs by means of their structural and stylistic features has already given some interesting results. Having analyzed the songs for a large group of ceremonies belonging to the tremendous Creation Ritual of the Pawnee, the writer discovered that what her Indian informant naïvely expressed as a "different voice" for the songs of each ceremony actually existed to a degree. In a number of cases the groups did conform to a rather well-defined pattern or design of composition, and certain peculiar stylistic features which are hard to describe off-hand gave them on the whole a similarity in sound which made it easy for one who had ever heard enough of them to become acquainted with the style, to recognize one of the type, even if not familiar with it as a specimen.

A few examples will illustrate these differences in structure as

well as the usefulness of the plot for this comparative work. Not all of the ceremonies are differentiated by completely individual types of songs and not one is lacking in examples of songs which are untrue to type and which have even been taken in theme from the songs of other ceremonies, but for some of the groups one type predominates which becomes fairly distinctive.

Skull Bundle Ceremony. (Pawnee.)

♩= 100 A
B
a b a c
U ra u ka tit wi ta si ka ra u | U
B
d a c d
ra ru ka tit wi ta si ka ra u | A wa ri ka tit
A
CODA.
a c d f e
ra si ka ra u | A wa ri ka tit ra si ka ra u

In the earlier ceremonies, which are by tradition the oldest of the group, no well-defined types are found. In the Skull Bundle Ceremony, however, the songs are mostly very simple and of fairly limited range. The ceremony is very much older and more sacred than the White Beaver which has a very clearly defined type of song. Age shows, I think, in the very archaic character of the tune given here. A measure analysis is inserted under the notes, consisting of letters which change with the motifs used. The frequent recurrence of the same letters shows how often the same little melodic ideas are employed. The Skull Bundle songs are a miscellaneous collection from remote antiquity. The example given above is merely by way of contrast with some of the songs of the later ceremonies.

It is at once apparent how the plot given below clarifies the structure of even so simple a melody as this. Here are revealed

three identical portions preceded and followed by short sections which may be called either A and coda, or Introduction and coda. The ascending ending on the second degree of the scale is easily seen, and the general placement of the melody in relation to the tonic or key-note. There are several Skull Bundle songs with ascending ends, and throughout the ceremonies there are quite a number more, which fact might be observed by those who like to insist that Indian songs always descend in trend and drop at the end.

Fig. 9 gives the plot of the above melody.

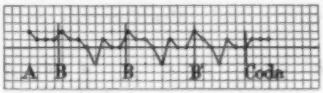


FIG. 9.

The Morning Star Ceremony is another very old and sacred ritual and, like the Skull Bundle ritual, is composed of songs of

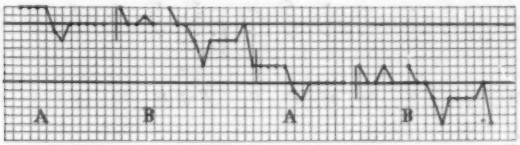


FIG. 10.

more than one structural type. One like that shown in the plot (Fig. 10) is very prevalent, however; in fact so much so that it may be said to characterize the songs of the ceremony. It is what I have called the "octave type" because we have a melodic theme which is reproduced on the octave below, and, if the song begins high enough and the singer's range will permit, is repeated a second time on the second octave below. Necessarily, the two factors of initial pitch and singer's range influence the structural features to some degree, but do not control those that enter into the original part on the highest octave. Octave structures are found in two or three of the other ceremonies but so rarely that they are plainly not typical of them, whereas in the Morning Star Ceremony they furnish the great majority.

Another type found in the same ceremony reminds us of the Skull Bundle songs except that it is possibly a bit more complicated (Fig. 11).

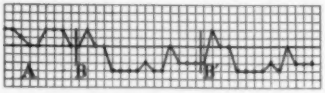
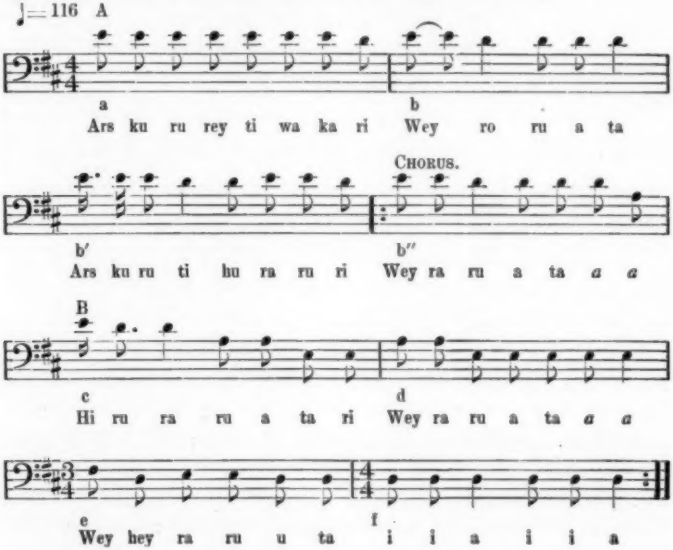


FIG. 11.

White Beaver Ceremony. (Pawnee.)

Sung by Good Buffalo, No. 6 North. First Ceremony, Second Song.

This White Beaver song, from the ceremony of the same name in the Pawnee Creation ritual, written out in full notation and accompanied by its musical analysis, will give an idea of the peculiar structure of the songs of this group and likewise show the advantage of the plot device in rendering it visible at a

glance. As far as the repeat marks, or to the double bar at the end, we have the verse proper, which consists of two sections, A and B, of four measures each, quite regular and correct from the standpoint of European standards. But part of the song is repeated for the chorus, as the informant called it. For this the return is not made to some natural division in the music such as at the beginning of the A or B phrases, but to the last part of the A phrase, after which little introduction the B phrase is repeated entire.

This peculiarity in the formation of the chorus appears in some form or other in practically all of the forty-eight White Beaver songs, depending on the composition of the verse proper. A number of variations in the manner of introducing the chorus are found,

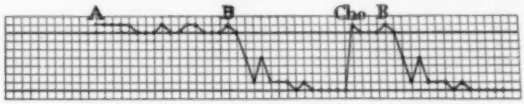


FIG. 12.

such as taking for the measure or so, which serve as introduction, material from some other part of the A phrase, from the first part of the B phrase, after which it is given in full, or by substituting new material, and so on. At times the chorus is introduced directly without the intervening connective. But these occasions are comparatively rare. Usually there is a return on beginning the chorus, to the middle of some phrase. Another peculiarity is the long level ending at the close of verse and chorus, and the great skip between the end of the verse proper and the opening of the chorus. There are several other minor features which are fairly characteristic of this group of songs, such as the play between the second degree and the tonic, and the two little rebounds in the melody after the first big drop in the verse and again in the chorus.

The plot (Fig. 12) makes the whole structure evident at a glance. It is given in full, whereas the music for the chorus is indicated by repeat marks.

The songs for the remaining ceremonies of the ritual are more or less like the White Beaver in general plan and seem to have been taken from this ceremony as a pattern.

It was quite by accident that, in turning the pages of Miss Densmore's "Teton Sioux Music" during the time that the Pawnee songs were being studied, the writer recognized in the plots of a few songs that Miss Densmore had given some that show the very design that pervades the songs of the White Beaver Ceremony and which is so peculiar in itself that it had been a source of more than casual speculation and study. This structural type is by no means common and considering the number of types that do exist and the fact that the range of possibility in

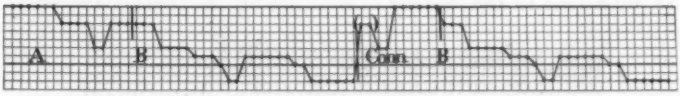


FIG. 13.

musical design and structure is almost unlimited it seems very significant that these two identical patterns should be found in the ceremonial songs of two medicine societies which belong to tribes of different linguistic stocks. It at least throws in more favorable light the proud boast made long ago by our Pawnee informant that the Sioux derived the idea of their medicine societies from the Pawnee. Had the writer been glancing through the music of both ceremonies in the same casual way in which she observed the plots, she might have felt that she had heard something similar before, but recognition would not have occurred as promptly, if at all, without the analyses and the plots as identification, especially as the actual melodies which conform to this structure are often quite distinct.

The above plot of one of Miss Densmore's songs (Fig. 13) represents a Buffalo Medicine song.[1] Not all of the group which Miss Densmore gives follow this pattern, and it is probable that in any ceremony there are exceptions, but this type, more or less modified,

[1] Frances Densmore: Teton Sioux Music (Bull. 61 Bur. Am. Ethnol.), p. 250, song 80.

is characteristic of the majority. There is one small difference between them and the Pawnee songs. In repeating for the chorus the Pawnee songs usually return at once to the highest note and this is usually the same as the first note of the song. In the Sioux there is an intervening note which serves as a step between the lowest and highest notes which would otherwise be separated by a great interval, but, since this lower note is also present in the A section, the principle of returning to the middle of the A phrase for the chorus remains unbroken. The introduction to the chorus, as I call it, is in the Sioux examples proportionately a little longer.

Probably enough examples have been given to illustrate the points that I have been trying to make, namely, that our study of Indian music must not be confined to the smaller details of artistic endeavor but must include the larger underlying plan to which these are attached as color elements or surface decoration, if the simile is permissible. The plots, in ridding us of the mass of confusing detail that obscures this plan and best of all in eliminating the musical symbols which are even now a great hindrance to clear understanding on the part of many people, will fill a long-felt want in furnishing a quick means of comparison and at the same time enable us to see the pattern without the progressive reading that is necessary with musical notation.

It is not claimed that the analysis of music from the formal side is the only one which counts in the characterization of style. It is quite as important to look for characteristic rhythms, scales, intervals, ways of beginning and ending, etc., as it was before. Color styles are quite as important as structural styles, but not more so. And never should the latter have been so completely overlooked by the students of primitive music as they seem to have been.

The principle of musical analysis that precedes the graphic presentation of it by means of the plot is employed by students of classical composition everywhere. There is nothing new in the division of a composition into motifs, sections, phrases, sentences, etc., but strangely enough students who have hitherto examined Indian music have never, apparently, worked at it from this angle, either failing entirely to see it, or sensing it only vaguely, unless,

indeed, they have taken it for granted that it would be patent to every reader; to which I offer the opposite opinion that it would not be evident even to musicians without a little study, since it can not readily be perceived in the process of progressive reading or hearing, while the non-musical reader would not perceive it at all. In my own work hitherto, the musical notation has been the chief difficulty in the way of presenting the subject in a manner intelligible to the average reader, even with the aid of phrase lettering. The plot removes this once and for all.

In concentrating solely on such problems as off-pitch singing, tonality, weak or strong beginnings, rhythms, size and frequency of intervals, tonics, high and low beginnings and endings, etc., it seems to me that students have failed to see the forest for the trees. Especially is this the case with off-pitch singing which is subject to so many almost unmeasurable conditions that it seems doubtful if we shall ever be able to deduce any laws concerning it. When we realize that many of the songs which are the material for our study are taken from old people who are supposed to know the songs best, but who also at the same time have the poorest pitch control, and when we think of the enormities committed in the direction of off-pitch singing among our own trained singers who should know better, the difficulty of the whole question begins to be apparent. There has been no attempt to measure the conditions under which the singing of the songs occurred which we accept as material, nor the variations that would occur in several renditions by the same and different singers, as well as the limits of ability to identify fine pitch differences on the part of the transcriber. On the whole the importance of the question of off-pitch singing seems to me to be much over-rated particularly in music where instruments are rare.

Many of the other points that have been investigated are, by their very nature, common over large areas, and those like rhythms begin to be important for our purpose only in the more complex combinations. The entire rhythm of a song, on the other hand, is so complex that it is practically never duplicated in another tune, as the following experiment will prove. One has but to tap out the note values of any song that others are apt to know to find

how readily the tune is recognized by those who have a reasonable rhythmic sense, even though there is no melody present. The melody alone, without its own rhythm, may be easily passed by, although very familiar, if given with absolute time regularity. But, if plotted, its similarity to other melodies constructed along the same lines will be at once apparent.

Investigation indicates that a tendency toward structural patterns does exist, especially in ceremonial songs, just as it does in totemic complexes, social organization, religious societies, graphic art, architecture, etc., and varies all the way from extremely simple combinations to very complex structures of design within design as in one of the Pawnee songs where there is chorus within chours. Just how extended this tendency is remains for future study to disclose, but the mapping of it and the use of it for comparative purposes certainly seems worth the effort. The results cannot be predicted at the present time, but there seems to be no reason why the principle of structure in music should not offer as certain a means of identifying different groups as the corresponding situation does in basketry, pottery, textiles, or any other phase of culture.

It seems advisable before closing this paper to make a few remarks on Indian music in general in response to repeated inquiries whether it were not possible to characterize it in some way. Some persons of considerable musical standing have, without any very profound knowledge of it, condemned it utterly as hideously lacking in melody, form, and variety. Only those who will take the trouble to study it can know of its often very beautiful melody, its surprisingly intricate forms, unappreciated by most of us because we are so fettered by the traditions, rules, and regulations of an art which with us came near falling into a rut. One of the features most enjoyed by those whose long acquaintance with Indian music makes it possible not to feel lost at every change of interval relationship (or key as we know it) or at constant shifts in metre which nevertheless combine themselves into form, is this remarkable freedom of expression.

When we consider that there are nine great culture areas in North America as they have been mapped out by students of the

subject, and that in each there are many local centers of style and structure for basketry, pottery, textiles, forms of dwellings, and so on, and when we recall the number of distinct linguistic stocks, is it fair to demand that the music of all shall be crowded, whether it will or no, into one great generalization? Asked to do this of graphic art, textiles, or languages, the anthropologist would stand aghast. So far as investigations have been made, they have hardly extended beyond the confines of single tribes scattered here and there. No systematic effort has been made to completely survey the music of an entire culture area, much less to compare that of each of the areas one with another, and from this comparison to draw a general conclusion. The work has so far been too vast and the points about the music which have been taken for discussion too numerous and dissimilar with different students.

More often the studies have been confined to certain types of songs within a given tribe, and not to a general presentation of the music, and naturally the first condition should precede the latter. There are some notable examples of the thorough musical canvass of certain tribes, such as Miss Densmore's Chippewa and Teton Sioux music, Miss Fletcher's Omaha, and Gilman's and Miss Curtis's work among the Hopi. But even with these there is still not enough for generalizations that might be taken as final. Burton has attempted a few, and I shall largely be repeating what he says, but I can not agree with his point of view that Indian music as yet is unformed and if left to itself would eventually have worked its way into the condition of European music, with its even, two-and-two balancing of phrases, its stilted forms, and its harmony. Indian music is unformed only as is any living thing which still has time to grow.

That Indian music would have evolved along the same paths as other music is an unjustifiable assumption—quite as much so as to say that the languages with constructions which reveal an entirely different way of looking at things would necessarily come to such a complete overthrow of systems as would be inevitable in order to arrive at the *modus operandi* of the great Indo-European language system.

Sounds, accents, and rhythms may, by their very nature, be

more or less common property the world over, but it is their combinations into structures that are individual.

First of all it may be noted that as far as investigations have gone we have found Indian music to be practically monophonic, even the choruses being sung in unison by men and women if we disregard the octave factor existing between their voice ranges. There seem to be more songs in major than in minor, and they are most of them quite short and contain very few ideas, poetically or musically, but these few are often elaborated in quite intricate ways, showing an appreciation for extensions, contractions, inversions, and other devices known to European music, although in some Indian areas they are very little employed. The songs vary from the simplest structures to those which are quite complex, and some tribes are markedly poorer musically than others. The music of all of them has this feature in common with that of primitive peoples all over the world: instead of new ideas being developed and added to others to make longer compositions, recourse is had to numerous repetitions of a few short themes.

As has already been said, there is great freedom of expression which excels any that is known to European and American music except within the last decade or so. It is rare that songs of perfect metric regularity are encountered or phrase balancing such as classical rules have prescribed. We might describe it as a music where there are no rules, except that the songs of a certain ceremony have a tendency to follow the same structural idea.

It should always be remembered that composing songs is a general practice among Indians. It is not confined to a few specially gifted members of a tribe. Everyone sings and has his own songs, although some are recognized as being better composers and performers than others. That all the individuals who add their efforts to the tribal output should be equally gifted not only with pitch discrimination but with musical taste one could not for a moment suppose. Such a demand would be rather heavy on ourselves. That is why in the vast mass of material that is collected the real gems are comparatively rare. The same condition would be found with ourselves even if we collected only from professional musicians.

Nevertheless, huge as is the task of collecting and sorting; slow, painstaking, and tedious as it must be if it is to be done scientifically and correctly, the doing of it not only achieves the ends outlined at the beginning of this paper, but enlarges our vision and enables us to see the real contribution the Indian has made in this field.

NEW YORK CITY.

THE ETHNOLOGICAL AND LINGUISTIC POSITION OF THE TACANA INDIANS OF BOLIVIA

By RUDOLPH SCHULLER

AS I HAVE stated elsewhere[1] far northwestern Bolivia is ethnologically speaking, one of the most interesting sections of South America, yet no corner of that continent is so little known as the regions north of the river Tuiche. Great confusion exists as to the linguistic and ethnological affinity of the aboriginal tribes inhabiting the territories referred to. Of course, it would be impossible, within the limits of a brief paper, to discuss the different classifications which have heretofore been proposed by other American ethnologists.

The fishing and hunting tribes of the "montaña" of Bolivia and Peru have never been treated as a whole. We know little as to their myths, legends, and social organization. In most of the works which refer to these Indians, there are to be found very meagre data respecting the physical habitus of the aborigines, the manner in which they built their dwellings, their industries, the customs observed in the initiation ceremonies, their marriage customs, their music and dances, their religious belief and ceremonies, their mortuary rites, etc. And in addition to this, the literature dealing with these matters, generally, is widely scattered, and very often difficult of access.

With respect to the languages, we possess several vocabularies with short grammatical sketches of the Tacana proper and the Cavineña dialect. Texts have never been gathered. Therefore the linguistic material utilized in this paper must necessarily be limited in extent. In writing this article, I have aimed at presenting, within a moderate compass, a clear picture

[1] Moseteno Vocabulary and Treatises, Evanston and Chicago, 1917, p. xxiv.

of the ethnological and linguistic position of the Tacana speaking tribes.

To the branch which I here propose to name the "Tacana Linguistic Group," belong the following tribes, but most of those belonging to the Tacana group proper are now extinct.

*Pamaino[2]
*Aguatšile[2]
*Utšupiamona[3]
*Pasaramona[3]
*Saparuna[2]
*Huawayana[2]
*Marcani[4]
*Guariza[5]
*Tšiliuva[3]
Tacana proper
Cavina or Cavineña[6]
Araona[6]
Toromona[6]
Maropa[6]
Sapibocona[7]

These tribes were, and some of them still continue to be, the lords of the virgin forest regions situated between the lower eastern slopes of the Andes and the River Beni, more or less between 12° and 15° south latitude, and 68° and 71° longitude west of Greenwich. In the north, they reached as far as the territories occupied by Pano-Aruác speaking tribes. East of them are to be found the Moxo. The tribe called Maropa, or Marupa,[8] formerly lived in and near the Mission de los Reyes, on the right bank of the Beni. West of the Tacana are the Kétšua, the Aymará, and the Lapatšu of Apolobamba.[9] The

[2] Indians who fought with slings and metal axes, mentioned in the "Jornada del capitán Juan Alvarez Maldonado (1567–1569)", publicada por Luis Ulloa, Sevilla, 1899; reprinted in Dr. V. M. Maúrtua's "Alegato Peruano," tomo viii. Chunchos; Madrid—Barcelona, 1906. The author of this all-important narrative must have been the pilot of Maldonado's expedition.

[3] "Carta de los misioneros fray Juan Muñóz, fray Juan de Ortega, etc., al Obispo del Cuzco"; Maúrtua, op. cit., pp. 96-103.

[4] Relacion Histórica de las Misiones Franciscanas de Apolobamba, por otro nombre Frontera de Caupolicán; La Paz, 1903, pp. 56–58; cf. Rivet, "La Langua Lapaču," p. 513, note 2.

[5] The Lord's Prayer in Guariza was published by Professor E. Tezza in his "Saggi Inediti di Lingue Americane," Appunti Bibliografiche; Annali della Universita Toscana, x, pt. I, Scienze Nool; Pisa, 1868.

[6] Likewise mentioned in the above quoted narrative.

[7] See my Moseteno Vocabulary, p. xcii.

[8] "Then came the Marupas, who occupied the junction between the Beni and Madre de Dios," says the anonymous author of the narrative.

[9] According to Créqui-Montfort—Rivet they belong to the Aruác linguistic family; cf. op. cit., p. 520.

Sapibocona attached to the mission of the Moxo were formerly the most eastern branch of the Tacana group.

Father Cardús[10] describes the Tacana of Tšiama as docile and agricultural. The Cavina, however, are considered by the same author as very averse to any kind of manual labor and personal subjection. These Indians work, D'Orbigny remarks, only in order to obtain food and European trifles, which they use for adornments. They are of darker complexion than the Moseteno-Tšumano, yet their color is almost white in comparison to that of the Kétšua and Aymará. The Tacana are as tall as the Moseteno and Xuracaré. The average height of the men is from 163 to 165 centimeters. There are many among them who have the body covered with large patches almost white, probably the same cutaneous disease which affects the Moseteno.[11] They do not differ widely from the latter. The Tacana are, however, of less feminine appearance. The face is regular and cheerful. The nose is short and somewhat flat. They are of relatively strong build, robust in shoulders, and well chested. The eyes are horizontal and expressive, the hair long and black.

It is the man who has to erect the hut for the family. The savage Tacana, both men and women, go entirely naked; the Araona women wear little aprons made from the bark of the Biboci tree and at times woven from cotton.

As to the Araona, Father Nicolás Armentia furnishes the following data. They are tall, strong, agile, and jolly, but extremely lazy. Some of them have beards. He observed also bald-headed men among them, a fact very seldom noted among South American Indians. They perform some agricultural work, but their primary occupation is the collection of forest produce. Their food consists chiefly of game, fish, and fruits, the last being collected by the women in the forest. They are skilful fishers and use quadrangular weirs made from palm leaves. Only primitive rafts are used as means of transportation. They build large houses, each of them occupied by twenty or more

[10] Las Misiones Franciscanas, pp. 168, 169; see also L'homme Américain. I, pp. 377–378, and Lafone Quevedo, Tacana, p. 6.

[11] Moseteno Vocabulary, pp. xxii-xxiii.

families, but each family with a fireplace of its own. They sleep in conical shelters, in order to protect themselves from the ferocious attacks of the zancudos.

Both Araona and Cavineña engage in agricultural work. The men cut down trees and bushes, but they do not take part in sowing, transplanting, harvesting, and so on. This and every other kind of agricultural labor is done by the women who also gather fuel, cook, and weave clothing.

The caciques of the Araona are polygamous; the other men of the tribe also have as many wives as they can buy or capture. These Indians generally have no great regard for the marital tie, and interchange of women occurs frequently. Marriage ceremonies are unknown to them. The father of the girl whom the man has selected is consulted, but the girls have no voice in the matter. The bride's price is an ax or two. In case of disapproval the girl is simply captured or carried off.

The weapons of these Indians are the bow and arrow. The latter are greater than those used by their Caripuna (Pano) neighbors. According to the above mentioned narrative of Alvarez Maldonado's journey down the upper Madre de Dios, the Pamaino fought with slings and metal axes.

The "almonds" of the *Bertholetia excelsa* are broken with small stone axes, which are fastened to the handles with very hard resin.

The chieftaincy is hereditary. The father is succeeded by his favorite son, who receives the title of Ecue,[12] and generally he is recognized by his kinsmen before the cacique's death.

A dead person is buried in his own hut, but funeral urns for the second burial have been used by both Araona and Toromona.[13]

From my sources of information, of course, it is very difficult to obtain a correct and clear idea as to the religious beliefs of the Tacana-speaking tribes.

Baba-Bu-Ada[14] is regarded as the demi-urge and ruler of the universe. He seems identical with Vutana, "the wind," who

[12] Armentia, Tacana, p. 10, gives *Ecuai putsu*, which means "ruler-being."

[13] Armentia, Cavineña, pp. 4–5.

[14] *ala* means "consanguineous," cf. *ala-piisi*, Cavineña.

lives to the south.[15] Buada's aid they beseech in all their enterprises. To their pantheon belong also a god of the sun, or the year, another of health, a third of the fire, and still others. The idols of these gods are kept in a house of worship, where are deposited also the ornaments and attire which the Indians don at their periodical religious feasts.

In an exploration made in 1887 in search of a route from the middle Madre de Dios to the river Aquire (Acre) Araona villages were reached. The men wore their hair long and plaited like the Chinese, and both sexes wore girdles and petticoats. The explorers, Colonel Labre and Mercier, report a rude form of government and worship. "Temples" with numerous idols of wood and stone were found, and the "priests" were in charge of all the religious ceremonies and duties. The idols were of three kinds. Those of the first class were a yard-high, cut from blocks of *tšonta* wood, carved with figures, and adorned with beautiful feathers. The second class called "the guard," were formed of ten lances of the same wood, two yards long, well-polished, and terminating at a point made of another piece of very fine wood. The third class of divinities consisted of many small stones, the origin of which could not be determined. The idols of the first-class were gods of the wind, the seasons, and the moon, and among them are many gods for the special protection of men. The small stones are intended to benefit agriculture—the maize, yucca, seeds, fruits and the ripening of harvests; but among them are the gods of rain, rivers, and lakes. There are also gods for fish and amphibious animals.

Women, because they are considered impure, are not allowed to take part in the worship or even to enter the temples. Armentia likewise states that the women are not allowed to see the idols and the attirements. Should a woman see them she would die, or at least become blind.[16] The women, however, play small flutes made from bones during the performance of the dances.

Feasts are celebrated with dancing, as are also the seasons of planting.[17] On these occasions the Araona garland themselves

[15] Evidently a "creator" in the sense of Andrew Lang, The Making of Religion, 2nd ed. 1900, p. 193 ff.

[16] Armentia, Cavineña, p. 13.

[17] Armentia, op. cit., p. 9.

with plumes. They play ball, and, having belted themselves with the bark of a tree, they receive the ball on the belly and with a strong movement cause it to rebound.

SUMMARY PRESENTATION OF THE ETHNOLOGICAL AND SOCIOLOGICAL STATUS OF THE TACANA

Habitations	Quadrangular houses, occupied often by twenty or more families.
Navigation	Small rafts. These Indians are not very expert craftsmen.
Fishing	Quadrangular weirs made from palm leaves.
Weapons	Bow and arrow, the latter being characterized by pitch-feathering.[18] Metal axes, slings, clubs, darts, and shields ornamented with feathers.[19] Big knives, and daggers (?) made of tšonta wood, lances (?)
Dress and personal adornments	The savage Toromona wore shirts made of cotton. The Araona women wore little aprons woven from the bark of a tree called *biboci*, and sometimes woven from cotton. The toucan (called by the Araona *parava*) feathers are kept in tacuára (cane) tubes.[20] The Araona wear necklaces made of pierced quaburn (wild boar-javali teeth). Rows of seeds are also used. Bracelets and the like below and beneath the knees are used by the Tacana women.[21]
Industries	Spoons made from *tšonta* (Bactrix) wood. Small stone axes fastened to the handle with resin. Fans made from palm leaves. Pots and jars of all sizes and shapes to hold water, and fermented drinks, to keep coca, etc. *Masa-mahi*, a kind of shirt, usually sleeveless and similar to the *cušma* of the Atsíri and the Amuéša Indians, are woven by the women.[22] Yet, judging from the Araona name, it seems to me that those shirts are made rather from the prepared fibres of a certain *tšonta* palm

[18] P. W. Schmidt, Kulturkreise und Kulturschichten in Südamerika, in Z E, 1913, p. 1036.

[19] Mentioned by the anonymous author of the narrative.

[20] Armentia, Cavineña, p. 10.

[21] Armentia, D'Orbigny, Tacana, p. 6.

[22] Armentia, Cavineña, p. 11.

	called by the Araona *mahi*.[23] From the same material seem to be made likewise the bags called *tsoro-mahi*; cf. *tumahé, totahi-palm, Tacana*, p. 75: cf. Cardús, op. cit., p. 293.
Musical Instruments	Little flutes generally made of bones, with three hollows.[24]
Fire-making	The method of making fire by friction of wood on wood and thus igniting the ground-off particles (fire-drill) is in use among these Indians.[25] According to Armentia, they are not very expert in fire-making by friction.[26]
Marriage	Either by purchase or by capture, according to circumstances.
Social Status	They are polygamous. General degradation of the women. Chieftaincy is hereditary. *Concentration of power*, the whole power being vested in the cacique who is an absolute despot and disposes arbitrarily of all tribesmen, their families and their property. They are reduced to a state not unlike slavery.
Religion and Ceremonies	Here we have an amalgamation of elements which belong to different cultural strata.
Disposal of the Dead	By direct burial.[27] Though there are indications that seem to point towards indirect burial.[28]

Here we may summarize the process of the gradual amalgamation of those elements which constitute the intellectual (religious) and material culture of the Tacana tribes.

Primitive Culture[29]	The method of fire-making. Little skill in navigation.

[23] Armentia, op. cit. p. 11, says, "woven from cotton."

[24] Op. cit., p. 13.

[25] Op. cit. p. 9.

[26] Generally they use the wood of the Jucaya, called by them *adiqui;* Tacana, p. 55 II.

[27] Armentia, op. cit., p. 13.

[28] Ibid., pp. 4-5.

[29] P. W. Schmidt, op. cit., p. 1022

P. Schmidt	Graebner	Ankermann-Foy
I. Exogamic-monogamous culture (pygmies and pygmoids)		Primitive culture
II. Exogamic, with equal rights for both man and wife	Primitive culture of Tasmania	

Culture: Exogamic-paternal organization.[30]	The bark belt. It is unquestionably related to that used by the Jamamadi Indians hunting with blow-guns.[31] This close-fitting gown enables them to blow more powerfully. The Araona evidently don their bark belt for similar reasons. To this culture belong likewise the daggers made from *tsonta* wood.[32] The idols of the god of the tiger, of the wild boar, etc., are traces of totemism. This cultural circle is the home of sorcery. The Araona were greatly given to the practice of magic arts.[33]
Culture: Exogamic-maternal organization.[34]	Necklaces made of perforated teeth of the wild boar. These teeth are closely related to the moon mythology. Here the moon is the ancestress (ancestor) of the tribe. The new moon is greeted by the Araona with shouts of joy. The worship of the moon is manifest.
	Shield and sling are characteristic weapons of the motherright culture.[35] The small stone axes, however, may belong to a later period. The same may be said as to the flutes with three hollows.[36] *cucu*, *xuxu*, "uncle," brother of the mother, is a very important word in the languages of tribes with female descent.
Free-motherright Culture[37],	Several families inhabit the same house (communal houses). The dead buried in the house. After a certain time the bones are disinterred, especially the skull, and then buried again in large

[30] P. W. Schmidt, l. c., No. IV. Graebner's "West-Papuan culture," Ankermann's "East-African culture," Foy's "Totemic culture."

[31] Wrestlers and carriers wore undoubtedly for the same reasons straps closely tied around the wrist.

[32] The term *cuchillo*, knife, employed by Armentia is rather vague.

[33] "In religious matters," says Colonel Suárez when speaking of the Caripuna-Pano of the river Madeira, "they do not seem to be as idolatrous and superstitious as the Araonas."

[34] P. W. Schmidt, l. c., No. V. Graebner's "East-Papuan Culture," Ankermann's "West-African Culture," Foy's "Bow-Culture (Two class system)."

[35] Shield and sling may indicate also Andean influence; cf. P. W. Schmidt, op. cit., p. 1053.

[36] This kind of musical instrument seems to appear for the first time, however, in the exogamic-mother-right culture.

[37] P. W. Schmidt, l. c., No. IV (instead of VI). Graebner's "Melanesian Culture," Ankermann's "West African Culture," Foy's "Bow Culture."

	earthen urns.[38] This method of burial is related to the head-trophy and the head-cult.
Free-fatherright Culture[39]	Fans made from palm leaves. Despotic government: tribesmen in slave-like condition. Absolute power of the chief or cacique. *Itseti Edutsi*[40] is the name of the god of the sun (Sun-cult).

Their rafts, as well as those used by the Moseteno, denote the influence of Andean culture. The metal axes of the Pamaino might have existed only in the minds of the Spanish adventurers. Shields and slings likewise show Andean influence.[41] Thus *livi-livi* (reduplication of movement) "sling" (honda) is surely a borrowed word.[42]

Pottery and the art of weaving were developed by them quite in accord with the above-mentioned cultural circles (Kulturkreise).

Baba-Bu-Ada is considered as the creator of heaven, the sun, the moon, and the stars. Whether he is the ancestor of the sun we do not know. He is the wind, and his residence is in the south. The feasts at the seasons of planting and harvesting are dedicated to him.

The masque dances are, undoubtedly, relics of a primitive secret society. The partial exclusion of the women shows how certain changes in the economic as well as in the political life of the tribe rendered obsolete the secrecy which during the period of matrilineal succession had been strictly observed in regard to those feasts from which the women had rigorously been excluded. The rise of secret societies is directly associated with the powerful economic position of the women during the period of matrilineal succession. These prerogatives, degrading as they were for the men, had to be counterbalanced, and, whenever possible, masculine authority over the women recovered.

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[38] Armentia found funeral urns with bones, yet without the skull. The head of the dead had probably been kept separate.

[39] P. W. Schmidt, op. cit., No. VII. Graebner's and Foy's "Polynesian-Culture," Ankermann's "Sudan-Culture."

[40] Armentia, op. cit., p. 12.

[41] P. W. Schmidt, op. cit., p. 1052 and p. 1053.

[42] *Viu-viu;* see Cavineña.

To sum up: The Tacana group represents, from an ethnological point of view, an amalgamation of totemic and exogamic tribes with maternal descent, which also were influenced by their highly civilized Andean neighbors.[43] The anonymous author of the above quoted narrative with well-founded reason states, "All these provinces are inhabited by people clothed in cotton, and all having rites and ceremonies like those of the Yunga in Peru."

MEXICO CITY.

[43] Moseteno Vocabulary, p. xxiv, where I stated, although erroneously, "Tacana, Leco, Araona, etc., were not much influenced by the more highly developed culture of Peru and Bolivia." Recent inquiries, however, have enlarged my knowledge as to the cultural and linguistic relations that doubtless exist between the cis-Andean tribes and the high culture of Peru.

THE DOMESTIC USE OF OIL AMONG THE SOUTHERN ABORIGINES[1]

By HERBERT B. BATTLE

OIL and fats are very closely allied in their chemical relations and their domestic uses, as well as in their other properties, and the two can not well be treated separately. Basally they consist of carbon, hydrogen, and oxygen. Less fundamentally they are chemical combinations of glycerin and certain acids among which may be mentioned oleic, palmitic, and stearic acids. If oleic acid predominates in the compound it is liquid and forms what we know as oil. If palmitic or stearic predominates, it forms what we know as fat. This brings us to other properties of these compounds, and we can subdivide them into those of vegetable and those of animal origin, with liquid and solid properties at ordinary temperatures. Oils and fats of this character differ essentially from the oils of mineral origin, such as petroleum, from which are produced mineral lubricating oils; we are not concerned with these latter in the present paper. Mineral oils when heated distill off without change of properties, while animal or vegetable oils when heated are decomposed with the loss of their properties and chemical nature.

Attention is called to the very important property possessed by some of these oils of absorbing oxygen from the air, with a resultant change of their properties, and especially one which causes a hardening in their nature. This fact gives us the drying oils such as linseed, the non-drying oils such as peanut, and the semi-drying oils such as cotton seed. For obvious reasons the drying oils are used at the present day in paint mixtures. The non-

[1] Presented at a meeting of the Alabama Anthropological Society held March 10, 1921, at the aboriginal cemetery at the mouth of Pintlala Creek, in Lowndes County, Alabama. The author is a member of the American Oil Chemists Society.

drying oils, as well as the semi-drying oils, are very widely employed because they are edible, and because of the facility with which they can be further used in producing solid food, such as margarine, butter, etc. These oils are varied considerably owing to the fact that they may, and do, contain one or more combinations of the oleic, stearic, or palmitic acid with glycerin. For example, the semi-drying cotton seed oil contains mainly the glycerin combination with oleic acid, as well as with stearic. The latter, when the oil is chilled by cold, becomes visible, settles away from the oleic acid solution, and becomes solid, dissolving however when the oil is warmed, and forming again the original liquid. Animal fats contain a preponderance of stearic acid with glycerin, and are accordingly solid at ordinary temperatures. They also contain the oleic combination in proportion, varying according to the source of fat. This property gives fat its oily touch and greasy effect.

Before leaving the chemical portion of the subject it should be stated that it is easy to separate these oily and fatty combinations with glycerin by the action of caustic of soda or potash, or by heat or mineral acid. The glycerin can then be preserved by appropriate means. Its uses are well known; among other compounds it forms the powerful explosive, nitro-glycerin. When oils are decomposed by caustic of soda or potash, another resultant compound is formed which we know as soap, it being the oleate, stearate, or palmitate of soda or potash. The composition is easily formed from materials of domestic origin, but the Indians did not know of this possibility. By leaching domestic ashes with water, the necessary caustic of soda and potash is secured, and by boiling with refuse fats from the domestic kitchen, or oils that are saved in various ways, a good quality of soap can be made in an ordinary boiling pot. The preparation of soap in this way was not known even to the ancient Romans, and the mighty Caesar, while using the luxurious baths of his period, had to be content with a rubbing down with oil with which ashes were mixed.

The general chemical properties of oil are as follows: Specific gravity 0.91 to 0.94, insoluble in water, hot or cold, but soluble in various ethers, chloroform, carbon tetrachloride, and turpen-

tine. Some of these facts were unconsciously taken advantage of by the Indians in ways that will be described later.

It is rightly to be supposed that any uses to which our southern aborigines applied the oils at hand could not have been other than the most primitive. Their mode of living would not admit of any advanced uses of these substances, or even a full knowledge of the simplest properties which they possessed. What they learned about them was due to almost self-evident facts, which came to light in connection with their daily customs. Also the sources for obtaining such oils and fats were those which commonly presented themselves in their regular pursuits, and they went no further in their search.

The oils and fats used by them were as follows:

1. *Oils and Fats of Animal Origin.* The principal and almost the entire source for these fats was the black bear (*Ursus Americanus*), which was found throughout the whole Southern region. The nature of this animal caused him to put on a large amount of fat during the summer and fall in order that he might go into winter quarters with a sufficient supply to last him until warm weather appeared. Consequently, taken at the proper season, these bears produced large quantities of oil and fat, as well as exceptionally good meat for food. Other wild animals furnished similar material, but it is certain that bears were the principal source of animal fats. "Bear ranges" were left by the several adjacent tribes for the exclusive propagation of these animals; there no towns were allowed and all hunted in common. Such a bear range extended from Line Creek, between Montgomery and Lowndes Counties, Alabama, as far as the Chattahoochee River.[2]

2. *Oils and Fats of Vegetable Origin.* These were almost exclusively from native trees, such as the black walnut (*Juglans nigra*), and the hickory nut (*Hickoria alba*) known now in some localities as "mocker nut." Also the shell-bark hickory nuts

[2] A paper on this subject was read by Mr. Peter A. Brannon at an earlier meeting of the Society. During the exploration at Pintlala just before the presentation of this paper a well-preserved half of the lower jaw bone of a bear was unearthed, with well-preserved teeth.

(*Juglans exultata*) were sometimes used. The live oak (*Quercus Virginiana*) yields acorns which were considered of great importance, and were much resorted to. Bartram[3] during his travels through this region in 1773–1776 describes this source as follows:

> The trunk of the Live Oak is generally 12 to 18 ft. in girth, and rises 10 or 12 ft. from the earth, then divides itself into three or four or five great limbs . . . sometimes to a distance of fifty paces from the trunk . . . . It bears a prodigious quantity of fruit; the acorn is small, but sweet and agreeable to the taste when roasted, and is food for almost all animals. The Indians obtain from it a sweet oil, which they use in the cooking of hominy, rice, etc., and they also roasted it in hot embers, eating it as we do chestnuts.

The black walnut furnished the most desirable of all these oils, and the earliest writers, notably those who accompanied De Soto in 1539-41 through this region, were impressed with its uses, and often referred to it. Ranjel[4] writes of it as follows:

> It was Saturday, the 5th of June that they entered Chiaha, and since all the way from Xuala had been mountainous and the horses were tired and thin, and the Christians were also themselves worn out, it seemed best to tarry here and rest themselves, and they were given an abundance of corn, of which there was plenty of good quality, and they were also given an abundance of corn cakes, and no end of oil from walnuts and acorns, which they knew how to extract very well, which was very good and contributed much to their diet, yet some say that the oil from nuts produces flatulence. However, it is very delicious.

The Gentleman of Elvas,[5] describing the stay of the explorers at this village, in another narrative written at a later date, mentions additional facts as follows:

> On the fifth of July the Governor entered Chiaha. The Cacique received him with great pleasure . . . and . . . the Governor answered him that his gifts . . . pleased him greatly. . . . There was abundance of lard in calabashes drawn like olive oil, which the inhabitants said was the fat of the bear. There was found likewise much oil of walnuts, which like the lard was clear and of good taste, and also a honeycomb, which the Christians had never seen before, nor saw afterwards, nor honey nor bees in all the country.[6]

In early times the black walnut was found everywhere in the interior, and in fact the Indians were in the habit of growing these trees near their towns either by transplanting or raising them from

[3] Bartram, Travels, London, 1792, p. 8.

[4] Narratives of De Soto, New York, 1904, vol. II.

[5] Ibid., vol. I, p. 74.

[6] This notable fact is also confirmed by Biedma.

seed. This indeed was almost universally practised, and even now we find trees growing on these old sites. It is not to be supposed that the original trees set out by the Indians are still living, but that the ones found there are seedlings from them. They were originally planted in straight rows, and even now they exhibit the same straight lines. Three such trees are on the site of old Fort Toulouse.

Preparation of Oils and Fats

There are three ways in use at the present time of obtaining oils and fats from the living things which produce them.

1. *By Rendering.* This is separation by means of boiling in water or steaming, which melts out the oils or fatty materials. These, being lighter than water, rise to the surface, and can be dipped off or allowed to flow to suitable vessels for cooling and for further purification.

2. *By Extraction.* This method is by the use of certain liquid solvents which dissolve the oily or fatty materials very thoroughly. The next step is to distill off the solvent and to recover it for future uses, leaving the oil alone and in a purer form. In this there is always danger of contamination from the solvent, and a consequent effect upon the flavor of the oils or fats.

3. *By Pressing.* This is the standard way in use at the present time in the manufacture of all oils in use in the cotton-seed oil, and peanut oil mills in this region. The meats or kernels from the nuts, after being removed from the hulls, are either pressed whole or rolled or ground by means of suitable machinery, hydraulic or otherwise. Then the meats are either heated or pressed cold, the latter plan securing the better quality of oil, but yielding a much smaller output. Pressing, however, leaves a high percentage of oil in the residual cake, something like 7 per cent, and this, of course, is lost as oil, though it is of value in the cake, which is ground and used as stock food.

Ancient Preparation of the Oils

As was to have been expected, all mechanical processes among the Indians in their every day operations were of the most primitive kind. The nuts must be cracked and the kernels or meats must somehow be extracted from the shells. All of this neces-

sarily required laborious work, which fell usually to the women. The maize or corn was broken and ground in a large wooden mortar, made from a section of a tree in which a cavity had been burned out to sufficient depth. The pestle was also of wood, and some feet in length. This operation was carried on while standing. The nuts on the other hand, being harder, required a harder surface, and more time was required to break them. This was done by means of another stone called a "hammer-stone." In many cases the hammer-stones are of granular quartz somewhat easily disintegrated, chosen for the reason that the rough surface would not slip from the nut when pounding it. It is more than likely, nay, almost certain, that the labor of the children of the towns was used to crack the nuts. The large flat stones called "nut stones" contained small cavities which were formed by hammering out with another more pointed stone. We find these at almost every village site.[7]

The hammer-stone was not difficult to secure, because stones of the required shape can easily be found in beds of streams, already rounded, and in many cases pointed by the water's action. The nut stones oftentimes have more than one cavity, in some cases as many as five. In this way five nuts can be cracked almost as quickly as one or two. Jones,[8] in referring to these nut-stones, says:

> Their cavities are so located that one, two, three, five and sometimes more nuts could be cracked at a single blow delivered by means of the circular flat crushing-stones so common.

To separate the oil from the cracked nuts, whether walnuts, hickory nuts, or acorns, the Indians knew but one way, the first method above described. They boiled the cracked portions in water without separating the meats from the shells, in a suitable pot which had also been made by the women. This caused the separation of the oil, and owing to its lower specific gravity and insolubility in water it rose rapidly to the top and was skimmed off and stored in pots of suitable size provided with covers. This is

[7] Later, a number of excellent specimens of nut-stones and hammer-stones were found near the place of meeting and served to illustrate these references.

[8] C. C. Jones, Jr., Antiquities of the Southern Indians, New York, 1873, p. 318.

described by Jones[9] in quoting Ranjel, Hariot, Bossu, and Lawson.

> The Southern Indians, especially those resident upon the rich valleys of the interior, devoted no little time and attention to agriculture. With them maize was emphatically the staff of life. Upon its nutritious properties they relied both during its milky state and when dry. . . . Generally beaten in a mortar, it was either boiled for hominy or mixed with hickory nut milk, walnut oil, or fresh bear fat, was baked into bread or fried as cakes.
>
> In combination with corn flour and when fried in fresh bear's grease, it (starchy extract from smilax roots) made excellent fritters.
>
> Walnuts and hickory nuts were diligently collected, cracked and boiled in vessels, when the oil, which rose to the surface, was skimmed off, and carefully preserved in covered earthenware jars. This oil was highly esteemed in the preparation of their corn cakes.[10]

Bartram[11] also described, in 1773–76, the general practice for securing the nut oil. The unsettled oily portion was used in the nature of milk or rich cream.

> I have seen above an hundred bushels of these nuts, shell-barked hiccory . . . stored up by one family [of the Creeks]. They pound them to pieces, and then cast them into boiling water, which after passing through fine strainers, preserves the most oily part of the liquid; this they call by a name which signifies hiccory milk. It is as sweet and rich as fresh cream, and is an ingredient in most of their cookery, especially homony and corn cakes.

How the Oils and Fats Were Used by the Natives

In order of importance the various uses of oils and fats were as follows: first, as food; second, in paints; third, in leather making or the treatment of skins; fourth, for bodily health; fifth, in hair dressing; sixth, for the rubbing and polishing of ornaments and implements.

1. *As food.* This use is of more importance than all the others. To the historical references already given, the following may be added, mainly from Jones[12] who also states that

> Under the term walnut, the historians probably included not only the nut which we designated by that name, but also the varieties of the hickory nut with which the country abounded.

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[9] Jones, op. cit., p. 44.
[10] Bartram, op. cit., p. 38.
[11] Bartram, loc. cit.
[12] Jones, op. cit., p. 316.

Biedma[13] says, 'In the province [Chiaha] where we began to find the towns set about with a fence, the Indians get a large quantity of oil from walnuts.' At various points reached during the progress of the expedition walnuts were found stored in the granaries of the natives.

Cabeça de Vaca[14] asserts that these nuts ground with a small kind of grain, furnished subsistence for two months in the year.

Jones[15] also writes:

> Among the natives in Louisiana the walnut was so important that the thirteenth moon was called the walnut moon, and it was during that month that they cracked their nuts.

Again, referring to the uses made of walnuts by the Virginia Indians, Hariot[16] says:

> They break them with stones, and pound them in mortars with water to make a milk, which they use to put into some sorts of their spoonmeat.

Again Jones says:

> Bernard Romans[17] assures us that the Florida Indians *used hickory nuts in plenty* making from them a milky liquid of which they were very fond, and which they ate with sweet potatoes.

It is interesting to record the fact that the Hon. W. T. Robertson, former mayor of Montgomery, has told the writer that he recalls that a Negro woman, a former slave, often employed this same process, pounding the nuts in a mortar and grinding with water to secure a milky emulsion with the oil in the nuts which was very palatable. This slave was familiar with many of the native medicines and remedies for the treatment of the sick, and oftentimes was able to cure loathsome diseases that had been given up by white physicians.

Such was the extent of the oil manufactured by the natives, that it became an article of commerce soon after the arrival of European traders, and was regularly exported. Bartram mentions meeting a caravan of pack horses, carrying skins filled with

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[13] Narratives of the Career of Hernando de Soto, Smith's translation, New York, 1871, p. 90.

[14] Relation of Alvar Nuñez Cabeça de Vaca, Smith's translation, New York, 1871, p. 90.

[15] See Du Pratz, History of Louisiana, London, 1763, vol. II, p. 195.

[16] A Brief and True Report, Frankfort, 1590, p. 18.

[17] Romans, Natural History of East and West Florida, New York, 1775, p. 68.

oil, bound for the Atlantic coast. In 1798–9, Hawkins in his "Sketch of the Creek County," records the trading value of a bottle of oil of hickory-nut to be 75 cents, when at the same time pork was $4.00 per cwt., which would make a bottle of this oil equal nearly 19 lbs. of pork. The trade bottle of that day was the whiskey bottle, of very heavy glass, black in color, squat in shape, and with a very deep deceptive depression under the bottom. Its capacity, originally possibly a quart, had dwindled to 1¾ pints. It is of record that an Ohio soldier, in training at Camp Sheridan in 1918, unearthed on the Connelly place near Montgomery, one of these bottles, actually containing some of the oil.

2. *In paints.* In ceremonies and for personal adornment, as well as for some of their utensils and implements, the Indians used paints to satisfy their desire for display. The base of all paint is a ground mineral or ore, mixed with some liquid material to cause it to be retained upon the surface on which it is applied. This process was known to the natives, and they used water, oil, or grease. For permanency the last two were used. They ground the mineral bases in cavities of hard flat stones of compact nature similar to those employed for cracking nuts, and they also used stone pestles in the same manner. The colors were red, black, vermilion, brown, yellow, and white. Most of these colors were obtained locally, from iron ores or various clays, or else were secured by trade from Indians of other regions. After the colors were ground, oil was mixed in and ground again. For applying the paint, we may well suppose that brushes were readily thought of and used, consisting of hair or bristles from the bear, deer, or other animals. Lawson[18] refers to the Indians of North Carolina as follows:

> Moreover they buy Vermillion of the Indian Traders wherewith they paint their Faces all over red, and commonly make a Circle of Black about one Eye, and another Circle of White about the other, whilst others bedawb their Faces with Tobacco-Pipe Clay, Lamp-black, black Lead and divers colors. . . . . It is impossible ever to know an Indian under these colors although he has been in your Home a thousand times. . . . As for their Women, they never use any Paint on their Faces [What a commentary on the present!].

[18] Lawson, History of Carolina, London, 1714.

The earthenware pots were often painted of a solid color, and others perhaps decorated. Broken portions of pots of solid red color are found at the present time in burials, and on the surface, the former particularly showing the color still well preserved.

3. *In Leather Making or the Treatment of Skins.* To preserve the skins of the wild game for their own uses, whether for adornment or personal wear, or for protection in sleeping and so forth, was the Indian's first desire. Strange to say, they were in many places acquainted with the action of certain barks to better preserve the skins of deer and bear, although they did not know the reason therefor, and leather by tanning was thus made in a primitive fashion. Jones[19] tells as follows of the method of doing this:

> They prepared their skins by first soaking them in water. The hair was then removed by the aid of a bone or stone scraper. Deer's brains were next dissolved in water, and in this mixture the skins were allowed to remain until they became thoroughly saturated. They were then gently dried and while drying, were continually worked by hand and scraped with an oyster-shell or some suitable stone implement to free them from every impurity and render them soft and pliable. In order that they might not become hard, when exposed to rain, they were cured in smoke, and tanned with the bark of trees. Young Indian-corn beaten to a pulp answered the same purpose as the deers brains.

Lawson[20] describes the practice of the Carolina Indians, as he found them, as follows:

> They wear shoes of Bucks, and some of Bears skins, which they tan in an Hour or two, with the Bark of Trees boil'd, wherein they put the Leather whilst hot, and let it remain a little while, whereby it becomes so qualify'd as to endure Water and Dirt without growing hard.

Salt is used at the present time in drying out the skin, when it is desired to preserve the hair, by rubbing on its under side. This dries out the raw skin, causes the constriction of the hair follicles, and so prevents the hair being lost. After being dried, it is worked by hand to make it pliable, and finally it is rubbed down with oil in order to make the quality permanent.

Without doubt this plan was in use by the Gulf Coast Indians,

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[19] Jones, op. cit., p. 62.

[20] Lawson, op. cit.

and probably others. Mention is made by the Gentleman of Elvas[21] of an experience at Cayas, in the present State of Texas:

> The salt is made along by a river, which when the water goes down, leaves it upon the sand. As they cannot gather the salt without a large mixture of sand, it is thrown together in certain baskets they have for the purpose, made large at the mouth and small at the bottom. These are set in the air on a ridge pole, and water being thrown on, vessels are placed under them wherein it may fall; being strained and placed on the fire, it is boiled away, leaving salt at the bottom.

That salt was used in the same region was very evident, for mention is made[22] of the skins in use at that place:

> Three Indians came the next day with loads of cow-skins, and three days afterward came twenty others. . . . He brought a present of many cow-skins, which were found very useful; the country being cold, they were taken for bed covers, as they were very soft and the wool like that of sheep. Near by, to the northward, are many cattle.

4. *For bodily health.* The Indians used bear fat and other oils to rub the body in order to make the skin supple and healthy. That they used oil internally is not stated, but they without doubt knew its value, on account of the large use it had as a food. Jones,[23] speaking of the Georgia Indians, writes:

> Oglethorpe shortly after the settlement of Savannah, speaking of the Indians food there, declares that they, as the ancient Germans did, anoint with oil and expose themselves to the sun, which occasions their skins to be brown of color. The men paint themselves of various colors, red, blue, yellow and black.

5. *In hair dressing.* This was also practised, and bear fat was used largely for the purpose. Lawson[24] comments on the practice in 1700 by writing:

> Their Dress in Peace and War is quite different. Besides, when they go to war, their Hair is comb'd out by the Women and done over very much with Bears Grease and red Root. . .

6. *For the rubbing and polishing of ornaments and implements.* Although we have no direct authority for the statement, we may be sure that the ornaments and implements bearing a polish which

[21] Narratives of De Soto, New York, vol. I, pp. 135–136.
[22] Ibid., pp. 139–140.
[23] Jones, op. cit., p. 257.
[24] Lawson, loc. cit.

has remained to this day were polished by the use of oil or grease, after the shape of the ornament or implement was secured by rough grinding with other stones. An additional rubbing after oiling would give the desired polish. In the many examples of finely polished hammer stones, ceremonial axes, gorgets, and other articles which we have at the present time, we can be reasonably sure they were polished in this manner. The natives gave to their bows the closest attention, for they were their main dependence in war and in the chase. The choicest woods were carefully selected, shaped, and preserved, and Jones[25] tells us that they were "frequently anointed with bears grease to render them flexible and keep them from cracking and breaking."

YIELD OF OIL FROM NUTS[26]

	Black Walnut (Juglans nigra)	*Hickory Nut* (Hickoria alba)	*Cotton Seed* (Upland variety)	*Peanuts* (Runner variety)
Wt. in grams per 50 nuts	531.	325.5	5.5	56.8
Number of nuts to the lb.	42	69	4100	511
Proportion percentage of kernels in whole nut.	10.26	19.50	53.50	73.15
Percentage of oil in kernels	50.30	67.42	36.25	46.60
Percentage of ammonia in kernels	6.56	2.17	6.25	5.45
Percentage of protein in kernels	33.72	11.16	32.13	28.00
Available oil in 100 lbs. whole nuts (gals.)	0.625	1.20	2.10	3.88

MONTGOMERY, ALA.

[25] Jones, op. cit., p. 257.

[26] Samples of both walnut and hickory nut oil were exhibited. They were produced by extraction with a solvent, which in this case was petroleum ether. Methods in use by the natives could not of course give an oil of the purity or appearance comparable to these examples. Samples of peanut oil, the native ground pea, and cotton seed oil were shown for comparison. All of these samples were of crude oil, and not refined by a chemical process. Refined oil by means of caustic of soda in the usual way was shown, as also oil bleached by standard fullers earth, great improvement over the crude oil being very evident. All of these processes were of course unknown to the ancients.

THE COMPLEXITY OF RHYTHM IN DECORATIVE ART

By GLADYS A. REICHARD

Introduction

IN PRIMITIVE art we frequently find such complex units that the motive of rhythmic repetition is very difficult to discern, in fact it sometimes seems to be entirely absent. But since we find a conception of order or rhythm in music differing from that which we readily recognize, it is quite conceivable that there may be a similar difference in art. In regard to this question Mr. Charles W. Mead of the American Museum of Natural History made a few observations (*Boas Anniversary Volume*, pp. 193–195) on Peruvian textiles and discovered what he called a "six-unit design." He found that the "six-unit" principle holds not only for one-row bands, but also for a larger surface composed of a number of rows. For example, six designs are repeated in the same order on a poncho so that they form six diagonal rows from left to right. From casual observations made of the Peruvian textiles exhibited at the American Museum it appears to the writer that a number of other "rhythm-units" and design combinations could be discovered, some of them exceedingly complex, owing to the extensive use of diagonals and zig-zag patterns, but nevertheless following definite mathematical laws.

Such a development is not surprising, however, when considered in relation to the other achievements of the Peruvians, e.g., the fineness of materials and weaving, the art of dyeing, and the combinations of beautiful colors. The occurrence of such phenomena formulates the question: Do primitive people have a definite plan in carrying out their ideas in beadwork, embroidery and other handicrafts?

The materials used in trying to answer this question are as follows: One hundred and five designs of beadwork and embroi-

dery made by the Thompson River Indians, which were collected by Mr. J. A. Teit; bands of skin in the collections of the American Museum of Natural History used for decoration of fur coats by the natives of Siberia; and Roman stripes on modern ribbons, girdles and silks as observed by the writer whenever occasion permitted. Conferences with Mr. Charles Mead and with Mr. M. D. C. Crawford, one of the editors of *Woman's Wear*, also proved helpful.

The question of rhythmic repetition is, in many cases, a simple one. There is no doubt, for instance, that there is a definite plan in repeating a design or group of designs on a Tlingit basket or on a beaded band from the Plains area. We are accustomed to recognize units of perhaps three or four elements even if no definite space separates them. Furthermore, we notice immediately an attempt at repetition of units consisting of as many as fourteen, fifteen or even more elements if a space is kept between the units, as is the case with the Roman stripes which have been in vogue for a number of years. But if, as happens in many of the Thompson River bead necklaces, the unit consists of a number of elements with no device to separate the units, it is more common to suppose that the rhythmic motive is absent and that the stringing was done aimlessly.

Not only have we discovered the existence of complex units, but we desire to know the reason for their occurrence. Several possibilities suggest themselves: Was the effect the result of chance? Did the artist have a definite design in mind and know that in carrying it out she would produce an aesthetic effect? Or, did she play with her technique and because of the desire for variation secure a satisfying object with no definite picture of the whole in mind as she worked?

In such a discussion it will be necessary to state that by an aesthetic effect we mean that the worker has made an object, which, to her, or to her and her social group, is satisfactory. We could not, for example, say that we consider every color combination used by a South African pleasing, although the effect to him would be perfect. On the other hand, we could not be assured that his taste would approve of many combinations which we

would call harmonious. Taste, after all, is a matter of cultivation; the people of Mozart's day did not fancy his music. Many of us have not succeeded in preferring jazz to Mozart, or in transferring our loyalty from the Italian to the Cubist school of painting. Let us then, in this discussion at least, consider the finished product and its beauty only from the point of view of its maker, and, if possible, withhold our own opinion with regard to its aesthetic appeal. We might, for the sake of clearness, substitute the word "satisfying" for "aesthetic" in this connection. Furthermore, let us be prepared, if occasion should demand, to dissociate proceedings which in our minds are commonly related, as for instance the association of design and color. Each may be developed without the slightest regard for the other.

Specimens Examined

Of the 203 sketches collected by Mr. Teit, 105 were sufficiently complex to be of interest in approaching the problem. These include necklaces made by simple bead-stringing, by combining several threads of beads, by looping threads of beads, by stringing beads and fringes, and by embroidering beads on skin; bracelets; dresses trimmed with beads and fringes; stripes on dresses and belts, and fringes on leggings. Besides beads, elæagnus seeds, cactus seeds, and dentalia were used, and sinew and hair serve for fringes. There are often two, three, or more necklaces or stripes of the same style which would indicate that they were made by the same worker. The material at hand gives positive data in the case of only two workers, Sinsintko and her daughter Tekwitlixken. These women made the most beautiful of the specimens collected, stripes embroidered in combinations of yellow, blue, black, white, red, and green.

Other examples which furnish data are the embroidered bands made by the Russianized natives of Siberia. The bands are nearly a foot wide and are used as borders of fur coats. They consist of a strip of red felt appliquéd with a zigzag skin design. A stripe joins the felt strip to the wide central portion which is made up of rectilinear design units embroidered on skin with silk floss of many colors. When speaking of the bands we shall

refer to this central portion which furnishes some of our conclusions because of the intricacy of its color combinations and application of the design. A second slit-embroidered piece connects it with a stripe of black velvet, ornamented like the red felt band, and the whole is finished by a narrow strip of skin, slit-embroidered and fringed. Four of these bands were examined, only one of which was sewed to a coat so that its position showed the intention of the worker with regard to symmetry. No other bands of the same kind were available but the similarities exhibited in these four leave little doubt as to the purpose of their makers.

It was suggested that observations of modern clothing might prove instructive. Some years ago, for instance, it was fashionable to trim dresses with buttons of various colors, the color-units repeated at such long intervals that a glance did not reveal the motive of repetition. Accordingly, Roman stripes in silks, ribbons, scarfs, etc., were observed. Through the kindness of friends who owned them I was able to examine about a dozen in detail. I noticed nearly a hundred, however, on the street, in subway trains and public conveyances. In every case it was possible to differentiate immediately the unit—sometimes of a large number of elements, sometimes of a few—because the designer had left a definite space of the tone-color between the units. Consequently the data on Roman stripes is disappointing, for the problem is to discover order in supposed chaos and this material leaves no doubt as to the designer's intention.

There occur, on the other hand, two relevant questions: How did the complexity of such design originate? How did the innovator get the idea of combining brilliant colors in stripes more or less wide, and how did he determine which colors should be used? The answer to the first question is lost in antiquity. Many very old and valuable shawls and scarfs are known to have come from Italy, but materials with the same principle of decoration come from diverse parts of the world, and their originators are unknown. The latter question provoked a discussion concerning how styles are created, and which ones succeed and why. In this discussion Mr. Crawford emphasized the difficulty in analyzing motives but gave grounds for fruitful speculation founded on his experience in studying women's dress.

Data Presented by the Specimens

Doubtless simple bead stringing offers a very great field for variety. There are not so many restrictions as, for instance, in embroidery or weaving. The embroiderer, like the mural decorator, must consider her space, the adaptation of working materials to the working surface, size, proportion, and the like. Accordingly, to produce a finished article she must have attained a high degree of expertness and consequently nicety of judgment. In stringing beads, however, there is only one dimension, length, to be considered; one bead or so, especially if small, would not greatly affect the appearance of a necklace or bracelet. Hence it should prove easier for a worker to make a symmetrical or rhythmic circle than otherwise. But ease of accomplishment is not always uppermost in the primitive worker's mind, and the results obtained show that other factors determine the appearance of the finished product.

Before describing the specimens two cautions must be given. First, symmetry may be due to the point of view taken. For example, the beading on the front of dress Fig. 14, *b* if counted from center down would be absolutely asymmetrical, but if counted from the bottom up to the center is symmetrical except that two elements (half a unit) are repeated at the meeting-point. Such an occurrence is doubtless due to the fact that the maker began at the bottom on one side and worked toward the center; then she repeated the process on the other side but misjudged her distance and required two more beads to fill the space. It is necessary then to attempt to read the specimens from every possible angle. Second, beads of varying size are strung to fill a given space which does not always require the same number. This fact is demonstrated in eight necklaces of which necklace 6 is an example (two small black beads on one side balance one large black on the other), and must be considered when regularity or symmetry is discussed.

We have considered as a rhythmic unit a combination of motives, either of color or design, which is regularly or symmetrically repeated. Such a unit may consist of any number of elements and varies from two to eighteen or more.

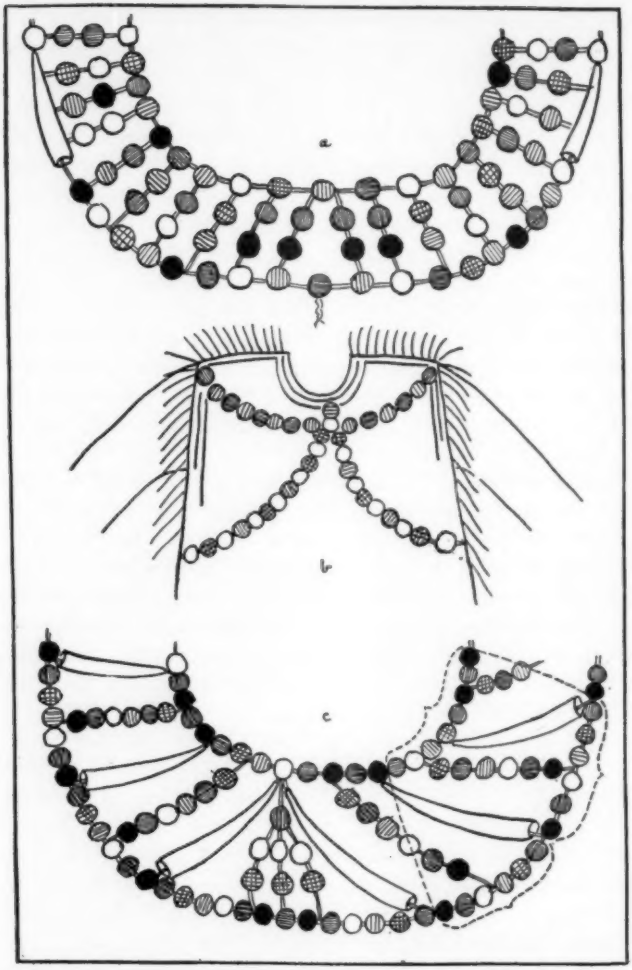

FIG. 14.— *a, c.* Necklaces; *b.* Bead decoration on dress. All from the Thompson Indians.

Thompson River Necklaces

Our first consideration will be the irregularities presented in bead stringing. A string can be threaded with various kinds of beads, and not have a single repetition of arrangement. The necklaces of strung beads will be considered in one group whether they involve loops and fringes or not, for their classification is purely arbitrary. It is more convenient to consider beadwork in the two groups, stringing and embroidery.

Of the thirty-nine objects of the first group, seven show definite irregularities, but of these only two lack a discernible attempt at order.

In the following schemes the small letters indicate small beads, the capitals large beads, and where primes are affixed, shades of the color indicated.

R	red	O	brown
Y	yellow	P	purple
G	green	D	dentalium
B	blue	W	white
A	black		

2 (p. 190). Read from tie at back. One of the two examples where no order whatever is discernible. There are 19 red, 8 green, 10 blue, and 8 yellow beads, all the same size, strung to form a necklace.

3 (p. 190). Beads same as 2. Main string two at a time, the colors corresponding on the two sides for about two-thirds of the distance, then strung at random. Between each pair of beads are fringes consisting of from five to eight beads of the same kind, two of which are paired and similarly placed and two alike but not similarly placed, one being the seventh and the other the ninth from the center loop. The scheme represents half the necklace read from the centre of the front; the letters arranged vertically represent the fringes; the / indicates that from that point on the main string is symmetrical.

4 (p. 190). Necklace of dentalia with beads as in 2, the latter arranged in fringes between the former, only two fringes being alike, one placed at the extreme back of the necklace, the other at the third interval between dentalia. The necklace appears untidy and careless in workmanship.

B B G R R B Y B R B Y G B R R R G R G Y B R R G R Y Y R R R B G R R G R Y R Y B B R Y G R

No. 2.—Necklace, irregular arrangement.

R Y G B R Y B Y R G A Y R G B G R/Y Y G G B R R Y Y B B R R G G B B R A A R Y B R . . .

	G		B		R		R		B	R	Y	R		G	Y	B	Y	G	R	Y
	B		R		R		G		B	R	Y	G		G	Y	B	Y	G	R	B
	R		R		R		G		R	G	R	G		B	B	R	G	R	Y	B
	Y		R		R		G		R	G	R	B		B	B	R	G	R	Y	B
	R		G		B		R		Y	B	G	B		R	R	Y	R	Y	B	R
	Y		G		B		R		Y	B	G	Y		R	R	Y	R	Y	B	
	R		G		B				Y		R	Y			B	R	B	G		
	B										R				B	R	B	G		

No. 3.—Necklace with irregular fringe and partly symmetrical main string.

D R D R D B G D G D R D R D R Y B B R G G R D B R D Y D B D R D R D R D

G		Y		Y		Y		P		Y					R		G		G		G		Y		B
Y		G		G		G		Y		B					R		G		Y		B		Y		G
B		B		B		B		B		G					R		G		B		Y		B		Y
R		R		P		P		G		Y							Y		R		P		R		P
								R																	

No. 4.—Necklace with dentalia and irregular fringe.

5. Fig. 14,*a*. Two strings of beads like those used before and dentalia connected by short horizontal strings of the beads, each beginning with one bead at the back and increasing to four in number in the front. Four of the cross-strings are similarly threaded and similarly placed on either side of a central bead, but there are no others alike. The illustration shows only the central portion of the necklace. Wide hatching represents green, close hatching red, cross hatching blue, solid black black; white represents yellow.

6 (p. 192). Small pale and dark blue, red, light and dark green, brown, yellow, white; and large black, green, red, blue and yellow beads form a necklace of very irregular appearance, but on one side a unit of 18 elements is repeated in reverse order to make symmetrical about one-third of the necklace; only this part will be shown.

7. Beads much like 6, but only small and large green, small and large blue, small red, brown, black, and white used to form bracelet with a clasp. Two units symmetrical with respect to themselves occur, one on each side of a pendant which hangs at a distance of two large and six small beads from one end, and at an interval of one large and fourteen small beads from the other. One symmetrical unit consists of a small red bead with a small green, large green, and small green on each side of it. The other has a large central blue bead and on each side a small blue, a white, and a green bead.

gGg r gGg o g a o a *gwb B bwg* o g r o
b
B
b
b
B

No. 7.—Bracelet with pendant.

8 (p. 192). Necklace of two strings of small brown, blue, red, and green beads. The inner string perfectly symmetrical from front to back with regard to space filled and number and color of beads. The outer string arranged with bead fringes, five on one side and ten on the other of a fringed, looped pendant. This necklace was

. . . wywbrwggrAwbwGRBgw|wgBRGwbwaarggwrbwyw. . . .

No. 6.—Bead necklace with portion symmetrical.

```
b o b o b o b o b o b o b o b r b r b r b r b r b r r b r r b r r b r b r b r b r b r b r b r b
                          g  g  g  g  g  g    g  g    g  g  g  g  g  g  g  g  g  g
                          o  r  r  r  r          r    r  r  r  r  r  r  r  r  r  o
                             b  b  b  b          b    b  b  b  b  b  b  b  b  b
                             o  o  o  o          o    o  o  o  o  o  o  o  o  o
```

No. 8.—Necklace with regular fringe irregularly placed.

```
R B R G B G R B R G B G R G R B R B G R B R B G B R G R G B R G B R B G. . .
R Y Y G G B B R R Y Y G G R R A A G G R R Y Y B B G G R R Y Y B B G G R R Y Y B R G G R R G. . .
```

No. 10.—Necklace of two strings (half only), inner string above, outer string below.

```
Y BR Y BR Y RBRB Y B Y RB|Y|BR Y R Y BRB Y BR Y BR Y BR
```

No. 12.—Necklace showing yellow as predominating color.

```
    GG      R       G       R                       BR      RR      YY      R
  BB   RR AA  RG BB  GR YG  YB YGRG       GGYB YG   YG YY   YB GG   RR BB  RG
R       G       R       B       R     RGYGR     R       B       R       G       R
 G      R YY  AB GG RG RR  YG  ABRB       BRBG  ARGR   RR   GY  BB   RY  RRBB
   GR       A       R       Y                                G       R
```

No. 13.—Necklace with loops.

made irregular purposely because the worker was "told to have it this way in a dream." Only the outer string will be represented.

The question now arises; how much of this irregularity is due to chance? There is little doubt that the maker of 2 had 45 beads and strung them at random, chance decreeing that no repetitions should occur. Necklace 3 shows partial symmetry as evidenced by part of the main string and by the number of fringes, there being fourteen on either side between the back and the central loop pendant. It would hardly be possible to ascribe these features to chance and we must conclude that, regarding design at least, the maker had a definite purpose.

Necklace 5 with its meagre show of regularity is interesting in comparison with a necklace of similar design; viz.,

9. Fig. 14,*c*. Same materials as 5, but dentalia take position of cross-strings of beads. The inner string is perfectly symmetrical, as are the outer loop and the connecting cross strings. The only inconsistency apparent (except two inconsequential mistakes) is that the centers of the inner string and the outer string, including the cross-strings, do not coincide. The result is slightly askew, and may give the impression that no method of construction was used. On the contrary, the necklace may be divided into very complex trapezoidal units (as indicated by the braces), a unit of inner string embracing two units of the outer string elements and the intervening cross strings, with only the lack of central coincidence before mentioned. It is impossible that such a production should be the result of chance and the conclusion is that 5 was an attempt to achieve an elaborate necklace of this style which failed, perhaps because the maker lacked judgment, ability to handle the technique, or thoroughness, or because the attainment of exact symmetry was considered unnecessary or not worth the application it required.

With regard to 3 the same conclusion must be reached, for necklace 10 (p. 192) is made of the same kind of beads combined in two strings with the essential difference that six color combinations consisting of from three to fifteen elements are used on the outer string (including looped pendant which will not be indicated in the scheme) and perfect symmetry is attained on both sides. Six

less complex units (of two to five elements) with repetitions form the inner string with as careful symmetrical execution as the outer. In this case the centers are coincident as are also the independent joinings at the back. There is only one error in the whole piece, and that a minor one, i.e., there is only one yellow bead on one side at the back, next to the joining bead, as opposed to two on the other side;—the theme of the outer string is carried out by the use of two beads of each color except in the pendant. Only one half of the necklace will be given since the other half is exactly like it. The red-blue-red combinations of the inner string might be considered as regularly repeated units with irregular separators.

The effect of 6 and 7 is the same and they may be considered together. From both it appears that the large beads set off a section which the worker felt should be symmetrically repeated, but which to her mind had no connection with the rest of the creation. A check on these exists also in the form of bracelet 11 which has the same style but is symmetrical in every respect even including a looped pendant, except for three errors: two blue beads occur on one side as opposed to one on the other, a blue bead takes a position on one side analogous to a brown on the other, and an extra white bead is inserted next to the clasp on one side.

g G g
w r w b o g o g y b b B b b B b y g b g o b w r
g G g

No. 11.—Bracelet with loop.

There is another explanation possible for stringing of this kind, namely limitation of material. Definite information is available in regard to a necklace of strung shells and turquoise owned by Miss Esther Schiff. The necklace was presented to her by Carol Trihillo, a Cochiti Indian girl, who had strung it herself. She had three turquoise beads and a so-called "lucky-stone." The latter must needs be placed at the centre of the string leaving an odd number of turquoises to be distributed on the two sides. Two were strung on one side with six shells between and the third was placed on the opposite side so that if it were placed

on the first side the third turquoise would fall exactly midway between the first two.

Perhaps the maker of necklace 6 encountered the same difficulties for she had 9 large beads and many small ones. She probably set out to make a symmetrical whole, discovered that material failed her and strung the rest of the beads in any order. She lacked the foresight exhibited by Carol in planning her necklace, for it would have been possible to form a symmetrical whole had she foreseen the possibility. It must be remembered, however, that her materials, being much more varied, required a higher degree of calculation. Also it is not known at which end she began to work, for had she begun at the other end (i.e., with the small beads) the argument would not hold.

Still another possibility is that the bracelet or necklace was made symmetrically and that beads broke and left the product asymmetrical. In the case of 6, it is hardly probable that as many as six of the large beads would break. Furthermore the small ones that are left are not similarly arranged on both sides of the center.

The same explanation may not be given for 7, for here we have materials which could have been arranged in regular or symmetrical order, as similar ones were in 11, but they were not. This then may be a result of "play with technique." Perhaps a woman saw 11, and, having similar materials, desired to vary the effect, and thus obtained 7 as a result. But, on the other hand, 7 may have preceded 11 in time of execution.

The irregular examples noted and the checks furnished by their regular counterparts urge us to conclude that in general entire lack of purpose is rarely shown.

Three necklaces of a different style from those described are interesting as illustrating the point that symmetry may be necessary in some respects and utterly disregarded in others. These necklaces are formed of small black, red, and white beads threaded in loops between two dentalia. In all three there are, instead of a loop, three beads—red, white, and blue—in the third unit from the back of the necklace, and in the second unit from the front a

large bead—in one case green (Fig. 15), in two cases red—is surrounded by small red beads and takes the place of the loops before described. In this illustration the white represents white beads. There is no doubt about the symmetry of these necklaces as the same idea is carried out in all three in precisely the same manner. But the loops of black, white, and red are irregularly threaded, it being almost impossible to find two alike, and the loop-substitutes which form distinctive elements show a peculiar characteristic. In two of the necklaces, the loop on one side is repeated in *regular* order (counting from either side) instead of in symmetrical order as might be expected from the rest of the necklace. That is, the unit runs blue, white, red on one side and, reading in the same direction, blue, white, red on the other (see Fig. 15). Our feeling for perfect symmetry would require blue, white, red on one side and red, white, blue on the other. In the third it seems to be necessary to have the three colors present, for on one side we have white, blue, red and on the other red, white, blue. Hence, it may be that as long as the elements are present, their order may be disregarded as well as in the less spectacular loops.

We may say, then, that in these three necklaces there is a definite plan with respect to design and placement of the units, but the order of the elements composing them is immaterial.

Besides the desire to attain symmetrical patterns, and the feeling for exact design, the following necklaces illustrate a third point, i.e., the importance of a single color in definite places regardless of the colors occurring between.

12 (p. 192). Beads same as 2, but none green, strung between two strings of small beads—one blue, the other red.

It will be noticed that there are an equal number of yellow beads equally placed on either side of the central yellow bead with one exception, and the color of the intervening beads is disregarded.

13 (p. 192). Beads same as 2, strung in loops usually two of each color at a time. None of the loops are alike but throughout the necklace the beads which joint the loops correspond on either side of the center loop.

FIG. 15.— Necklace of beads and dentalia (Thompson Indians).

In 14, a double string of beads of the same kind as 2, the design is formed by the arrangement of the red beads:

Y **R** G **R** YG **R** YGB **R** GGG **R** GYBG **R** BYG **R** YG **R** B
B **R** YB **R** GB **R** BG **R** YBG **RRR** YBG **R** BGYG **R** B **R** B **R** B

No. 14.—Necklace in which red is design color.

The following scheme in which the dashes represent colors not red, may bring out the design a little more clearly:

– R – R — R — R —— R —— R — R — R –
– R — R — R — R — RRR — R —— R – R – R –

Another example of this type of work will be given among the stripes embroidered by a member of the same tribe.

Thompson River Wearing Apparel

The effect of bead stringing, looping or fringing is obvious in a necklace or bracelet. But another psychological element is introduced by fringes on wearing apparel such as we find on the sides of bags, pouches, dresses, coats or leggings. It may be granted that exceedingly complex designs on an extended surface may be discerned at a glance by an eye trained or accustomed to see them. But it is utterly impossible that such can be the case with fringes which hang down in a position not at all similar to the one held when they were made.

The fringes on five leggings are regular in stringing and in placing—if the legging or pouch is held so that the fringes fall in the same plane. They consist of sinew, hair, or skin strung with beads alternating with an empty fringe.

Four others become more elaborate, consisting of from two to six elements in the fringe unit, and, finally, 15 shows an exceedingly complex symmetrical arrangement. If the fringes are numbered they read from top to bottom thus:

1 2 3 D 2 1 2 3 2 1 D 2 3 2 1

In this example the fringes of the centre are longer than those on either end but the color scheme is consistently carried out. (See also Teit, The Thompson Indians of British Columbia, Jesup Expedition, Vol. 1, fig. 313). In contrast to the ten regularly fringed leggings, we find only two fringe arrangements

irregular. Fringe 16 is on a woman's pouch which shows only a very limited surface and is, therefore, inconclusive. A legging number 17 is trimmed with fringe like necklace 3. It is similar to the necklace in its irregularity also, for only four fringes are alike and they are placed at irregular intervals. The dashes indicate a fringe of hair or sinew.

	–bb r bbbb ——	r
gg b R bb r b ——	1. –bb r bb r b —	y g bbb rrr
		r
gg bo bo bo bo bo b–	2. –bb r bbbb——	g
		y gg bb
gg r B rr b r ———	3. –bb r bb r b —	y
		r rr ggg
Dentalium————	–bb r bb r b —	y
		g gg rrr g
gg bo bo bo bo bo b–	2. –bb r b r bb ——	y
		y
g b R bb r b ———	1. –bb y b r bb —	r rr bbb rr
		g
gg bo bo bo bo bo b –	2. –bb r b r bb ww	b bb ggg
		r
g r B rr b r ———	3. –bb r bb r bb ww –	g gg rrr g
		b
g bo bo bo bo bo b —	2. –bb r bb r bb www–	r r ggg rr
		y
g b R bb r b ———	1. – bb r bb r bb www–	b bb ggg rr
		y
Dentalium————	–bb r bb w b ———	r rr bbb gg
		y
g bo bo bo bo bo b——	2. –bb r bb r bb ww —	g gg rrr
		y
g r B rr b r ———	3. –bb w bbb w ———	b bb
		y
g bo bo bo b ———	2. – bbbbbb———	r gg r
g b R b ———	1. —R—	
	—B—	

No. 15.—Fringe on legging with complex arrangement.

No. 16.—Fringe on legging with modifications near center.

No. 17.—Fringe on legging irregularly arranged.

In the face of the facts presented by this material we may be almost certain that there is present the element of play, or we might call it desire for variety. The worker perhaps became

tired of stringing all the fringes alike and changed one or more of them. If the final result was satisfactory she made bold to make more changes and thus obtained a more complex design, even attaining as elaborate an effect as 15. It is quite possible that she did not realize the rhythmic motive when the work was finished, but only during the process of creating. A flaw in this reasoning is broached by the question, Were the simple fringes made first and did the others follow in the order of greater complexity? Such a question cannot be answered from the mute evidence of the material. But, whatever may be the answer, there can be no doubt that the worker's satisfaction consists of the survey of the work *as made*, and not in the appearance of it *as used*. For the fringes here described, when worn, show absolutely no care in arrangement and appear as an irregular mass of glass and hide.

Thompson River Stripes

Of the twenty-nine embroidered stripes examined, twenty-three show designs of greater or less degree of complexity regularly repeated and need not be discussed here. Seven, however, show characteristics worthy of special notice. Fig. 16,*g* and another stripe are similar in color and plan, consisting of blue, green, white, brown, and yellow spaces each separated by a narrow stripe of silver beads.

In this stripe the close hatching represents brown, the wide hatching green, the cross hatching blue, the heavy stippling yellow, the fine stippling silver and the white white. Fig. 16, *g* is symmetrical except that an extra green element occurs on one side and an additional white one on the other. There are no smaller units comprising the large symmetrical units. The other stripe is perfectly symmetrical except at the center which is marked by a blue diagonal portion on one side and a yellow one on the other.

The colors of another stripe are regularly repeated in a five-element design but the spaces filled differ in size. Fig. 16, *h* is composed of the same colors, namely, red (close hatching), black, blue, and yellow, but the units are not all alike. The black-yellow-blue-red-blue unit is used twice; then two larger spaces are filled with a black-yellow-red-blue-red-blue motive and the stripe is finished by two black-yellow-blue units. The second

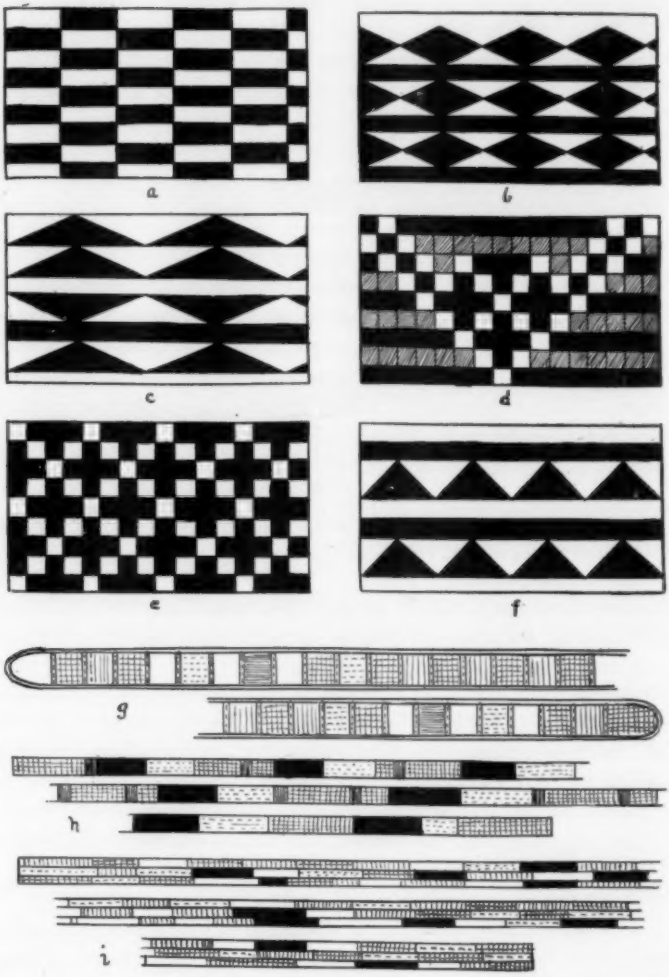

FIG. 16 — *a-f*. Designs on Siberian coat-bands; *g-i*. Stripes on Thompson Indian dresses.

design appears like an extension of the first as a space-filler, but the extra, as well as the original, red and blue elements are subtracted from the two final motives. Or conversely, the stripe may have been begun with the blue-yellow-black unit, and the others may be a gradual elaboration of the end unit. This explanation seems to me more reasonable, for such designs are usually begun at the end and worked inward. There is no doubt, however, that the arrangement with the introduced variations is far more effective than without them as in the preceding stripe. Here it is quite possible that the artist played with her materials, probably not realizing what the effect of the finished product would be.

Three stripes made by the same worker show interesting variations.

Fig. 16, *i* consists of three rows or stripes, each composed of narrow (about ⅛ inch) elements of blue, green, yellow, white, and black embroidery, placed one above the other. The same color may overlap in two of the three rows but never exactly corresponds. There is no regularity or symmetry noticeable except that the blue elements are grouped at the ends leaving the central portion yellow, white, black, and green.

A companion stripe omits the blue elements, but introduces spaces composed of silver beads. The colors of this stripe are arranged in two rows. If there is any regularity it is not apparent, although the effect is more than pleasing.

Stripe 18 is very similar to Fig. 16, *i* but much simpler. It is a single stripe, there are no silver beads and the key color is yellow, i.e., there are three spaces filled with other colors, followed by one yellow which alternates with another color—black, green, or white—for six spaces and then the scheme is repeated, the whole stripe appearing graphically as follows (the dashes represent colors not yellow):

— y – y – y – y — y – y – y — y – y – y — y – y – y — y – y – y –

The stripes described, except Fig. 16, *h* and its simpler counterpart were made by Sinsintko and her daughter TEkwitkixkEn. Since there are numerous examples of perfectly rhythmic stripes made by them, and since they combine peculiar color effects such as these even in making representative designs (as evidenced by

a note of Mr. Teit) it is almost conclusive to say that they play with their materials. As they have attained a high degree of virtuosity, the result of their play is satisfactory, not only to themselves but also to others not accustomed to their style. In 18 we have another very good example of the importance of a predominating color such as that presented in necklaces 12, 13, and 14.

The Coat-Bands of the Russianized Natives of Siberia

a. Design

There remain for discussion the borders on the fur coats of the Russianized Natives of Siberia. It will be recalled that only the embroidered central portion of these borders has been analyzed. The surrounding stripes are simple in decoration and need not be discussed. The designs consist of combinations of rectilinear geometric designs as illustrated, Fig. 16, *a*, *b*, *c*, *d*, *e*, and *f*. The light and dark spaces indicated represent contrasting colors which may not mean that only two shades are used in the design; more may occur. Such a representation makes clear the design feature as opposed to the color motives. Only by considering the two independently has it been possible to reach the solution of the problem as presented by these borders. By the introduction of a number of colors (sometimes as many as five) the designs *d* and *e* assume a slightly different aspect, but fundamentally the illustrations are typical.

Each of the borders 70/5736 and 70/5735 (catalogue numbers of the bands in the American Museum) consists of twenty-four elements.

70/5735, the simpler in design, consists of a unit composed of elements *c*, *a*, *b*, *d* repeated six times in the same order.

The elements of 70/5736 are arranged in this order:

d ca(bdc) e(cdc)a (bdc) a(cdb)e (cdb)ac

It will be observed that the band is symmetrical on each side of the small unit (bdc) except for one error on each side; (bdc) or its reverse (cdb) will be recognized also as a part of the larger symmetrical unit as indicated by the parentheses. The central unit (bdc) is either the front or the back of the border. Judging from the position of a similar band on coat 70/6999 it

is the front. If such is the case the irregularities occur under the arms. This phenomenon corresponds with that observed by Jochelson on the Koryak robes, and there has doubtless been influence in either direction, that is, from Koryak to Russianized natives, and vice versa.

Borders 70/7831 and 70/6999 consist of twenty-two elements, the latter being simpler in arrangement:

dbaf dbaf af dbaf dbaf dbaf

Here is complete regularity except where the two extra designs meet in the front where only half the design *fa* is used.

The design plan of 70/7831 may be represented thus:

1	2	1	1	2	
bdfa	bdca	bdfa	bdfa	bdca	bd

The arrangement, consisting of two units of four elements each, is self-evident.

There is room for little doubt as to the design plan of these bands. There are no definite rules regarding the size of the elements, but their place in the band seems fixed beyond dispute, since all show the same consistency in arrangement.

We do not, however, encounter the same consistency in the

b. Color Combinations

Among the Thompson Indians there was very little evidence (and that was scarcely tenable) that green was confused with blue or yellow. Discrimination was always made at least between the ordinary colors—blue, green, yellow, red, black, and white. Even purple and brown appear to be carefully differentiated. However, there was not such variety of color found in the beads used by them as we find in the embroidery flosses imported by the Russianized natives. They use every shade and tint of all the usual colors which they can procure. They know that blue and green are different, for both may be used in the same design. If they considered the two colors as one there would be no design formed. But on the other hand, blue and green may be used indiscriminately if only one is needed. For example, there would be no hesitancy in using blue to complete a design begun in green if material of the latter color became exhausted. A medium tint

of purple, too light for purple, too dark for lavender, is classed in the blue-green category. Dark shades of blue, green, brown, and red may be used instead of purple or black, and in one case a brilliant orange appears to take the place of red. Besides these classifications yellow and pink may be interchanged. From such observations, then, it may be inferred that the most important aim is to effect a contrast, although there is no inability to detect differences in color, but merely a mode of classification differing from ours. In other words, there is a color feeling, but no differentiation between color, shades, and tints.

Observers of the neighbors of the Russianized natives confirm these remarks in general. Middendorff (quoted by Ratzel, *History of Mankind*, II, p. 213) says the Tungus were able to distinguish tints only after long pondering. Ratzel (ibid.), in speaking of the Lapps, believes that the difficulty is not one of inability to distinguish but lack of vocabulary for expression. Jochelson gives the Koryak color terminology which agrees fundamentally with that displayed by the specimens under discussion. At any rate the limitations of vocabulary are confirmed by the psychology presented in working out the design.

With these qualifications, then, we may present the results obtained by a careful analysis of color use on the coat borders. In all of the bands the odd places are occupied by two-color combinations, these being with very few exceptions blue-yellow and red-blue. I have been able to discover no regularity in arrangement of these combinations. We may perhaps consider them as separators, and proceed to an investigation of the method of filling the even places. The following groups are general indications of the combinations. (It must be remembered that every imaginable shade or tint may be used for any one of the colors specified.)

(t) = blue, white, black.
(x) = white, yellow, purple.
(y) = red, white, purple (black, brown, blue, green)
(z) = red, white, yellow, dark shade of blue, black or red

The arrangement may now be represented graphically for the four bands, i.e., the filling of the even places.

70/5735												
Places	2,	4,	6,	8,	10,	12,	14,	16,	18,	20,	22,	24,
Combinations	z	y	z	x	z	y	z	x	z	y	z	x
70/5736												
Places	2,	4,	6,	8,	10,	12,	14,	16,	18,	20,	22,	24,
Combinations	s	y	y	?	s	y	y	y	s	y	y	y
70/6999												
Places	2,	4,	6,	8,	10,	12,	14,	16,	18,	20,	22,	
Combinations	y	y	y	y	y	y	y	y	y	y	y	
70/7831												
Places	2,	4,	6,	8,	10,	12,	14,	16,	18,	20,	22,	
Combinations	y	y	z	y	z	t	x	y	y	t	y	
			(y)									

It is hardly necessary to point out the rhythmic repetitions of 70/5735 and 70/5736; they are very obvious; 70/6999 does not, by any means, give the appearance of the consistency shown in this classification because of the very great differences in tint and shade of flosses used. 70/7831 appears unplanned and careless although in reality the effect is quite as good as in the others, since even in the most elaborate ones, the arrangement is not apparent and can be discerned only after the most detailed scrutiny.

Such complications as are shown by these bands could not have been the result of play, especially when we realize that they have been achieved simultaneously with the complexities of design before noted. Finally we must remember that the separating elements which fill the odd places further complicate the effect. 70/6999 has eliminated one source of complexity by keeping all the even places filled by the same, or approximately the same, combinations. The last border, 70/7831, fails to present any well-defined plan, whether the odd places or the even are considered, or even if the two are taken together. It may be well to recall, however, that in this band the design symmetry, while not quite as elaborate as 70/5736, is more perfectly carried out.

Generally speaking, these bands show that where the greater complexity of design is found the simpler becomes the color arrangements, and conversely, but in each case perfection in design predominates.

It is my opinion that these bands must have been carefully planned before they were made, and where the worker was skilled in the art of calculation and possessed judgment with regard to space and proportion the results are products almost phenomenal in execution. Where the worker had attained a smaller degree of virtuosity the result suffered either in becoming more simple or in being inaccurate. This inaccuracy shows itself in the display of the color alone, whereas the design remains symmetrical with few errors. The adaptation to the working surface has been secured by lengthening or shortening the design elements rather than by changing their number, for there is no regularity in their size.

Origin of Modern Styles

We have had brought to our attention the results of primitive craft; the question of origin is now relevant. To get at the root of this query we knew of no method except an attempt to explain the styles of our own civilization. Mr. Crawford pointed out a conclusion which we had drawn from the observations given above, namely, that the world's *creators* in any art could be counted for the most part on the fingers of one hand. It is estimated that for every dress, coat, or hat which "takes" with the best-dressed women, fifty have been submitted for approval and summarily discarded. But of all the many presented for criticism, only rarely does one production appear which is actually unique. All the rest are adaptations of what has gone before—play with the technique.

The source of the original ideas is as elusive as the temperamentality of the great audience which adopts or discards them. Their innovators say they are due to "inspiration," our primitive friends "see them in a dream," and that is as far as we get. We know, however, that behind the inspiration or dream is the desire to please and it may be satisfied by the deliberate execution of symmetry or regularity as well as by purposeful departure therefrom. The satisfaction obtained in the irregularity of a Thompson River stripe may be as great as that secured by using one shoulder band of velvet and one of flowers to support the bodice of an evening gown. And as long as the aim is attained it matters little what means are used to achieve it.

Conclusion

The specimens examined and analyzed give undisputed evidence of the desire to achieve a satisfactory effect. The few departures from the attainment of it are due to lack of perspective, limitation of material, carelessness, or failure to acquire virtuosity in the use of the technique.

It is very common to find symmetry or regularity, but both occur more often in execution of design than in color. Satisfaction is found quite as often in variety as in regularity and much variation is secured by extending units to a high degree of complexity or by preserving design and simultaneously changing color. One color sometimes predominates and the others perform the rôle of space-fillers, their colors being unimportant.

There are few creators and many imitators; the latter secure their effects by adapting their materials and the use of them to the designs furnished by the innovators they are following. They, too, have a desire for change and find it, not through inspiration or dreams, but by experimentation or play with materials and method. In some cases, the whole creation must be visualized before it is begun, and the results of such foresight are shown by great complexity.

In drawing these conclusions we are limited by the scantiness of our acquaintance with the chronology and with the makers of the art forms. To overcome these limitations we suggest that specimens from other areas be examined, that artists be interviewed with regard to motives whenever possible, that examples of known authorship be analyzed, and, if possible, the time of manufacture with respect to other results of the same worker be ascertained. In this way the worker's motives may be discovered and also the relative occurrence of simplicity or complexity.

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JAMES MOONEY

JAMES MOONEY

James Mooney was born at Richmond, Indiana, February 10, 1861, and died in Washington, D. C., on December 22, 1921, in his sixty-first year. His father was from West Meath, Ireland, and his mother from Meath, where the ancient capital of Tara is situated, and which in former days appertained directly to the Irish crown. He was educated in the public schools of Richmond and afterwards taught for two terms himself. In 1880 he entered the office of *The Richmond Paladium* where he worked both at the case and in the editorial room. Early developing an exceptional interest in the American Indians, he read omnivorously upon the subject and walked many miles to obtain books dealing with them. His devotion to this study culminated a few years later in a secret determination to make his way to Brazil in order to investigate the aborigines of that country, but in Washington he had the good fortune to meet Major J. W. Powell, the founder of the Bureau of American Ethnology, then in its infancy, who became so much impressed by him that he gave him a position under himself. This was in the year 1885, and from that date until his death Mr. Mooney retained his position as Ethnologist in this institution pursuing almost continuous researches among the Indian tribes of the Southeast and the Great Plains. He focussed his attention particularly upon the Cherokee and the Kiowa but extended his studies to the Cheyenne and in a lesser degree to many of the other tribes of the trans-Mississippi country and the Great Plateau. His reading was so extensive that it covered nearly all of the peoples of America north of Mexico. Before leaving Indiana he had begun the compilation of a list of Indian tribal names which was afterward of material assistance in the preparation of the well-known "Handbook of American Indians" in which he took an active part. Still later he accumulated the materials for a monumental work upon the

population of the tribes of the same area which still remains in manuscript.

In addition to his strictly scientific work he prepared Indian exhibits on behalf of the Government for the Spanish Columbian Exposition, Madrid, Spain, 1892; the Columbian Exposition at Chicago, 1893; the Tennessee Centennial and National Exposition at Nashville, 1897; the Trans-Mississippi Exposition at Omaha, 1898; and the Louisiana Purchase Exposition at St. Louis in 1904, from some of which he received medals in acknowledgement of his services.

He was one of the founders of the American Anthropological Association, a member of the Anthropological Society of Washington, of which he was Vice-president in 1909–10 and President in 1914–15, and a member of the Mississippi Valley Historical Association and the Nebraska State Historical Society.

He always had a deep love for the country of his ancestry, was an officer and local organizer in the Land League at the age of eighteen, and was a moving spirit in the formation of the Gaelic Society of Washington which he served as President from its foundation in 1907 until 1910. He wrote a number of articles on Irish customs, gave considerable attention to the study of the Irish tongue, and followed the home rule and republican movements with the utmost sympathy.

Mr. Mooney's attitude toward the subjects of his study was not merely scientific. He took an intense personal interest in them, was always ready to listen to their troubles, to lay their difficulties before those who might be able to adjust them, and to spend time and money in aiding them to obtain any and all advantages which he believed to be their just due. When he had once reached a conclusion he maintained it with unfaltering courage and clung to it with a tenacity which not infrequently seemed to his friends to be carried to extremes, but of the honesty of his intentions there could be no doubt. This attitude was oftenest in evidence in defense of a subjugated race or an oppressed class, for which the circumstances of his ancestry were no doubt largely responsible. But beneath all was an intense emotional attitude which was a part of himself and was the secret both of his success

as an ethnologist and his influence as a man. From this particular point of view he has had few equals among ethnologists and certainly no superiors. In consequence of it he had a wide acquaintance among peoples other than the Indians and those of his own race and among classes other than that to which he naturally belonged. At the time of his death he was recognized as the leading authority on the Cherokee and Kiowa Indians, as well as a foremost authority upon the Indians of the entire Plains area, while no one was probably as well read on the earlier history of the tribes north of Mexico taken as a whole. In 1897 he married Ione Lee Gaut of Cleveland, Tennessee who, with six children, survives him.

On the day after his death a meeting of ethnologists and anthropologists of the Bureau of American Ethnology and the United States National Museum and the officers of the Smithsonian Institution was held to pay honor to Mr. Mooney's memory and the following resolutions were adopted:

WHEREAS: The scientific staff and the other co-workers of the Bureau of American Ethnology and of the Department of Anthropology of the United States National Museum and the officers of the Smithsonian Institution have received the sad intelligence of the death of Mr. James Mooney on the 22d day of December, 1921, who was for thirty-six years an Ethnologist in the Bureau of American Ethnology: Therefore be it

Resolved, That we do here and now record our profound sorrow in the severing of the many ties that have bound us to him during the long period of his official service in a chosen field of special effort; and that we keenly feel the loss of a painstaking and sympathetic co-worker and tireless student, whose knowledge of those ethnic activities of the American Indian, to which he gave especial attention, was unsurpassed, if indeed equalled, by that of any other scholar, and was of infinite value not only to the work of the Bureau of American Ethnology but also in kindred anthropological study wherever it may be pursued in the world at large, and whose devoted interest in his chosen study and research has been in the highest degree a source of inspiration to his colleagues and associates.

Resolved, That we share deeply in the grief of all anthropologists at the untimely passing away of one who was at once a noted student and worker in the field of ethnology, a patriotic citizen tolerant of all spiritual faiths, a fine example of Christian gentleness, and who possessed a marked independence of character and a charming personality as a man and as a friend.

Resolved, That we respectfully tender to the members of the family of our late associate our sincerest sympathy in their great bereavement.

Resolved, That a copy of these resolutions be transmitted to the family of our late collaborator and friend.

(Signed) J. N. B. HEWITT,
Chairman of Committee on Resolutions

Committee on Resolutions
J. N. B. HEWITT
WALTER HOUGH
JOHN R. SWANTON

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1907. Indian Missions North of Mexico. (A reprint from Bulletin 30 of the Bureau of American Ethnology, 39 pp.)
1907. A Cheyenne Tree Burial. (The Southern Workman, vol. XXXVI, pp. 95–97.)
1910. The Indian Ghost Dance. (Proceedings and Collections of the Nebraska State Historical Society, vol. XVI, pp. 168–186.) (An address delivered before the Society.)

1911. My Life among the Indian Tribes of the Plains. (Ibid., vol. XVII, pp. 88–95.) (An address delivered before the Society.)
1911. The Indian Woman. (Ibid., pp. 95–103.)
1911. Systematic Nebraska Ethnologic Investigation. (Ibid., pp. 103–109.)
1912. Marking the Oregon Trail. (American Anthropologist, vol. 14, p. 200.)
1915. A Cheyenne Dictionary. (Note) (Ibid., vol. 17, pp. 213–214.)
1915–16. The Passing of the Indian. (Proceedings of the Second Pan-American Congress, vol. 1 (Anthropology), pp. 174–178.) (An address delivered before the Congress.)
1916. The Greenland Eskimo: Pastor Frederiksen's Researches. (Journal of the Washington Academy of Sciences, vol. VI, pp. 144–146.)
1919. Piscataway Indians. (The Indian Sentinel, vol. 1, no. VIII, pp. 22–24.)

Numerous articles in the Handbook of American Indians (Bulletin 30 of the Bureau of American Ethnology), in Johnson's Cyclopaedia, the International Encyclopaedia, the Catholic Encyclopedia, and the International Year Book (1898–1899), besides literary material, principally reviews, in The Nation.

Manuscripts

Cherokee Medical Formulas.
The Heraldry of the Kiowa.
The Indian Population.
The Peyote Religion.
Notes regarding the Roumanian Gypsies.

BOOK REVIEWS

METHODS AND PRINCIPLES

Introduction to the Science of Sociology. ROBERT E. PARK and ERNEST W. BURGESS. The University of Chicago Press, 1921. XXI, 1040 pp. $4.50 net.

This comprehensive and, in spite of the number of pages, quite portable volume is a source-book that will undoubtedly prove of considerable value to teachers of sociology. The method of selecting short and pregnant passages seems excellent since it permits the assemblage of a great variety of distinct points of view under a single cover. Each chapter is furnished with an introduction by the compilers, as well as by a selected bibliography, topics for themes, and questions for discussion. Experience seems to prove that even the most rigorously historical attitude toward social phenomena can not long remain wholly free from an attempt to formulate the processes involved in the events studied. Accordingly, anthropologists will do well to acquaint themselves with the views of men like Sumner and Hobhouse, Durkheim and Simmel. Even where they may feel inclined to doubt or qualify, they will derive stimulation, possibly leading to a more adequate formulation; and certainly the book before us will be of the greatest value in showing them the scope and character of recent sociological thought.

ROBERT H. LOWIE

NORTH AMERICA

Indian Village Site and Cemetery near Madisonville, Ohio. By EARNEST A. HOOTON and C. C. WILLOUGHBY. Papers of the Peabody Museum of American Archaeology and Ethnology, Harvard University. Vol. VIII.—No. 1. 1920

Dr E. A. Hooton and Mr. C. C. Willoughby in this publication describe the results of eight years excavation of a prehistoric Indian village site and cemetery near Madisonville, Ohio. The exploration was carried on intermittently from 1879 to 1911. It is a timely contribution to the field of Ohio archaeology and adds considerable information regarding the Fort Ancient culture.

The first section of the report deals with the history of the exploration from the time Dr. Metz discovered the cemetery until the exploration was completed in 1911. Following this the burials are dealt with and by careful comparisons with the mortality statistics of European countries, as well as on the basis of the historical evidence, it is concluded that the cemetery was probably the burying ground of a village of from four hundred and fifty to five hundred in population for a period of about a century immediately prior to 1650.

A comprehensive description of the cache pits including their purpose and present contents is followed by a mention of the hearths and post holes. In connection with the latter it seems as though the writers had missed a very important point. While the house circles nearby show the use of circular dwellings, in at least one case a rectangular structure was outlined by the post holes. This would indicate an early use of rectangular dwellings which later gave way to the circular type.

The artifacts are very fully written up by Mr Willoughby in his usual clear manner. His descriptions are detailed and accurate and the specimens are compared with similar ones from elsewhere. They are well illustrated and the section concerning them constitutes one of the most important contributions of the book.

The skeletal remains have been carefully studied by Dr. Hooton who includes the results of an investigation by Dr. Farabee on the femoral torsion. The conclusions reached by Dr. Hooton are that, while the Madisonville dwellers were related to the Tennessee Stone Grave group and the Iroquois group, they were probably more closely related to other groups in Ohio and Indiana that have not yet been studied.

Another point which might well have received more attention is a study of the dog bones. In the two cache pits mentioned on page 32, five per cent of the bones found were dog bones. There was evidence—not mentioned—of careful burial having been given to at least one dog. Several others were not so carefully buried but were not disarticulated. Thus something of the status of the dog in the community and the different types of dog might have been included. A mound containing several skeletons, about one hundred yards east of the cemetery under a water tank on the "Stites property," was excavated in 1911 but is not mentioned.

One error I notice on the map is that trench L seems to be

incorrectly located. It should be placed south of trench H and east of trench D. If it was desirable to refer to the gravel pits the one at the southwest corner of the cemetery, which has encroached on the latter, should have been noted as it is perhaps the most important.

The article as a whole is well written and of timely interest to students of American archaeology. It is hoped that Mr. Willoughby and Dr. Hooton will be able to continue their work and publish the results of the other Peabody Museum expeditions to Ohio, for instance the one to the Turner group, which made so many unique and interesting discoveries.[1] BRUCE W. MERWIN

SOUTH AMERICA

Las Constelaciones del Orion y de las Hiadas. R. LEHMANN-NITSCHE, Buenos Ayres, 1921. (De la Revista del Museo de la Plata, tomo XXVI, paginas 17 á 69.)

This is one of a series of forthcoming publications by the same author relating to the ethno-astronomy of primitive South America, an almost untrodden field in which it is most desirable that we should be aided and guided by the author's knowledge and experience. He introduces his subject by contrasting the attitude of primitive and civilized man towards the heavens, that of the former being based on some magical element or formula. For example primitive tribes regard the sun and moon as actual personages and they see in the moon an actual face instead of the image or comparison which we perceive (p. 2). This attitude must be studied and comprehended by those who seek to interpret primitive ethno-astronomy. How were the constellations formed? They were recognized in very ancient and barbarous times in the Old World and, with a few conspicuous exceptions, they have been associated with objects so arbitrarily chosen with respect to the alignment of their stars that it seems very unlikely that similar objects would be associated with the same stars by independent observers. The alignment of the stars of a constellation determined its name. Imaginary lines drawn from star to star on the boundaries of the constellation defined that alignment. Similarities in the constellations of widely separated peoples may often be explained by Bastian's theory of elementary concepts. When certain phenomena, in this case cosmical, react in a similar

[1] Since this was written the report on the Turner group has appeared. (Papers of the Peabody Museum of American Archaeology and Ethnology, Harvard University, Vol. VIII, No. 3.)—ED.

manner on the "cerebral mirror" of the observer, the identical results demonstrate the unity and homogeneity of the human race, but they do not indicate transmission. The emphasis laid on the opposite view has largely been due to the literal belief in the Biblical tradition of the derivation of all mankind from Eden. This tradition has seriously interfered with the advance of scientific knowledge. Nevertheless there undoubtedly have been ancient relations between America and the Old World and it is the duty of Americanists carefully to investigate such relations, especially in somatology, comparative mythology and the study of the native calendar and astronomy of Mexico and Central America. The author seems to oppose the view that any seasonal element enters into the symbolism of even the zodiacal signs. Here the critic must part company from him. The signs, properly speaking, do not pertain to primitive astronomy and the symbolism of their primitive constellations has probably been considerably modified to accord with seasonal phenomena. The author justly emphasizes the fact that primitive constellations were originated by primitive people, not by savants, and therefore they do not include such objects as the printing press and microscope of our uranography nor similarly inconsistent concepts.

Dr. Lehmann-Nitsche asserts categorically that no constellation in primitive South America bore its Eurasiatic name and that it is a sad error to believe that anything like the zodiac of the Old World was known there and then. As to the latter half of this statement the critic, notwithstanding his respect for the opinion of Dr. Lehmann-Nitsche, and recognizing his own fallibility, must state a very definite conviction to the contrary based on evidence of which he has published only a very inadequate outline as yet. Though willing to accept the author's statement if confined to the really primitive tribes of South America, he is prepared to assert that the cultural leaders among the Aymará and Quichua of Peru were acquainted with a normal zodiac of twelve signs. In the nature of things the knowledge of this zodiac was confined to the instructed few even at the zenith of Inca culture and it is not at all astonishing that no trace of it can be found today among the ruder tribes of the continent or the ruder descendants of that culture. That fact proves nothing against the testimony of Blas Valera and Calancha and the traditions reported by early writers. But Dr. Lehmann-Nitsche is soon to publish a detailed monograph which will oppose the existence of this zodiac and the critic hopes before long to publish his complete studies which

he believes demonstrate its existence. He only asks that students will suspend judgment on these divergent views until both can be adequately presented.

Dr Lehmann-Nitsche then offers us a detailed statement of the various names and concepts associated with Orion and the Hyades by South American tribes, prefacing this with a summary of names and concepts attached to them in the Old World The resulting comparison of South American and Eurasiatic symbolism reveals no point of similarity except the name "tapir's eye" possibly applied to the star Aldebaran, our Eye of the Bull. Yet while names are indeed entirely dissimilar, the Patagonian association of the three stars of Orion's Belt with the three balls of the bolo with which animals are hunted is certainly suggestive when applied to the Giant Hunter of the sky, and Pirua, the granary, assigned by the author to the Hyades, reflects the cereal symbolism of Taurus and the Pleiades throughout the world.

All anthropologists must be grateful to Dr. Lehmann-Nitsche for the publication of this valuable monograph and the promise of more to come.

STANSBURY HAGAR

EUROPE

A Text-Book of European Archaeology. By R. A. S. MACALISTER, Litt. D., F. S. A., Professor of Celtic Archaeology, University College, Dublin. Vol. 1. Paleolithic Period, Cambridge University Press, 1921, pp. xv, 610.

The present volume is only the first of a series projected by the author to cover eventually the whole field of European prehistoric archaeology. The title page informs us that it covers the Palaeolithic Period, but the reader will find that it does more than this. After the introductory, three of the remaining ten chapters are devoted to Geological, Palaeontological, and Anthropological *Prolegomena* respectively. Then some thirty pages of Chapter V are required in which to dispose of *eoliths;* and finally Chapter X is given to what the author chooses to call the *Mesolithic Period;* in other words the stages which are generally referred to as the Azilian-Tardenoisian and the Campignian, including the epoch of the shell heaps. There is therefore in the volume a good deal more than the title suggests.

In dealing with facts, the author strikes one as being eminently conservative. On the other hand, in making use of acceptable evidence for purposes of interpretation, or as a foundation on which

to build theories, he exhibits an unexpected courage that fairly grips the reader. These two notes—one of boldness and one of caution—are distinguishable throughout the volume; each is dominant by turns and it would be difficult to say which is the more convincing. The note of boldness is certainly the more interesting.

The author is evidently over cautious when he rejects all evidence of Tertiary man, or of his precurser, based on the working or utilisation of flint; for such an able, careful, and conservative specialist as the Abbé Breuil accepts unconditionally the artifact nature of certain flints from two distinct Tertiary horizons at Ipswich—one at least as old as the lower Pliocene and the other of upper Pliocene age.

Ultra-conservatism has also dictated his conclusion of the whole matter in regard to the Piltdown man when he says that, owing to the circumstances of its discovery, the Piltdown skull "must be written off as one more of the many pieces of valuable scientific material wasted." (p. 203.)

In Chapter X there is an interesting discussion of the psychology of upper palaeolithic man. In the prehistoric field there are still unscaled heights and unpenetrated depths, and the author is to be complimented on his laudable attempt to bring us nearer to one of these.

GEORGE GRANT MACCURDY

INDONESIA

Through Central Borneo; an account of two years of travel in the land of the head hunters between the years 1913 and 1917. By CARL LUMHOLTZ. 2 vols. Charles Scribners' Sons, New York, 1920.

A work which will give pleasure to many readers. It is a popular account of journeys in and on the borders of the unexplored nucleus of Borneo in contact with unspoiled natives of this fascinating tropical forest. The travel events are well told and the narrative moves with a calmness and balance of statement which is very refreshing. Enough scientific observation of value to the specialist is introduced to bring the reader into the aura of the jungle life with its human and animal denizens and their associations. This picture will be appreciated by scientific students who seek to catch a glimpse of the earlier stages of man.

From Mr. Lumholtz's work we gather that the rust, so to speak, of racial interminglings for many centuries has eaten far into the great island of Borneo, leaving only a central core of what may be considered pure stocks. Very wisely Lumholtz began his investigations far in the interior.

It has appeared wise to the Dutch administration of Borneo, of whose methods Lumholtz speaks highly, to prevent the Malay pressure on the wild tribes, not only to preserve them for scientific study but with the knowledge that they become of less value to the Government when mongrelized. Lumholtz brings out a very interesting feature in changes which have occurred in portions of forest tribes at the river heads who have come in contact with somewhat more advanced tribes down river.

Lumholtz disposes finally of such myths as those regarding tailed peoples and white Borneans.

In the appendix are collected 23 folk tales of some of the tribes visited by the author and special notes on various tribes. There is a good map showing the author's journeys. The photographic illustrations are numerous and excellent.

Some of the topics treated are: Climatic and biological conditions; population; racial problems; meeting Punans, the shy jungle people; Malays versus Dyaks; Kenyas f Central Borneo; funeral ceremonies; priest doctors; feast- -lings; the Penyahbongs, men of the woods; the Saputans; piercing; among the Penihings; Punans and Bukats, simple minded nomads; a burial cave; omen birds; religious ideas; head-hunting, its practice and purpose; characteristics of the Long-Glats; natives' superiority to civilized man; tatuing the whole body; the flying boat; facts about the Ulu-Ots, the wild men of Borneo; the belief in tailed people; the legend of the ancestor of tailed men; the practice of incision.

WALTER HOUGH

MISCELLANEOUS

L'Eternuement et le Bâillement dans la Magie, l'Ethnographie et le Folklore Médical. P. SAINTYVES. Pp. 143. Paris, 1921.

This little book will be found handy to consult by anyone who, from the point-of-view of ethnography, is interested in the subject of omens. It presents a large amount of remote or esoteric information on sneezing and the kindred phenomenon of yawning as viewed by primitive people and country-folk.

As a corpus of information the book is altogether replete. Its matter, however, is hardly digested. M. Saintyves himself acknowledges the brevity of the comments in which he discusses the features which form the bulk of his book. Such attempts at discussion, he says, "aim to throw light upon that well-known course of evolution

which, starting from a sort of undifferentiated animism, passes over to a spiritistic pluralism and finally finds its goal in naturalism, without, however, precluding lights cast from the point-of-view of a unitarian theology." Such a program we are at a loss to discuss. Its impressiveness cannot fail to strike the reader who may deplore with us that a fuller commentary has not been made part integral of the book.

M. Saintyves's opinion is, in one instance, that the salutations offered to the sneezing person have a twofold origin, physiological and philosophical. The quasi-incoercibility of sneezing led man to single it out as an unusual manifestation among the other issues of the spirit to which he found himself liable. On the other hand sneezing pertains to the head and as such commands a due share of the attention which this sacred part of man's body receives among some primitive peoples. Such generalizations, however philosophically plausible, always raise a wish that the various areas in which this or that type of explanation obtains be more coherently pointed out.

It is interesting to read that some analogy was perceived by the ancients between sneezing and epilepsy. A fit of sneezing was construed as a milder manifestation of the *morbus sacer*. An epileptic fit often terminates by sneezing. Hence have some modern physicians been led to provoke sneezing in the patient to hasten the termination of the fit.

There remains, as one goes over the pages of the book, no aspect of culture which a study of this kind might leave untouched, so multifarious were the meanings put on sneezing. It is to be regretted that M. Saintyves does not bring his views to a more incisive point of formulation. His book stands with the practical qualities, but also the magnified limitations of an encyclopaedia article grown beyond its limits.

P. L. FAYE

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DISCUSSION AND CORRESPONDENCE

The "Blond" Eskimo—A Question of Method

In the *American Anthropologist* for July-September, 1921, Diamond Jenness reopens the discussion of the cause of the reported "blondness" in the Copper Eskimo. He takes the stand that the theory of Scandinavian infusion among these people is groundless. With this position I have no quarrel. Indeed, after an examination of some of the "blond" hair, I am rather in sympathy with it. The first six pages of Mr. Jenness's article are as logical and critical as might be asked for. In these pages it is made clear that the "blondness" referred to is by no means a Scandinavian blondness, but a slight diminution of pigmentation such as is quite frequently seen among Chinese, Japanese, Polynesians, Indians, and other Mongoloid peoples.

Mr. Jenness then undertakes to show by anthropometry that the Copper Eskimo are unmixed. He has apparently succeeded to his own satisfaction. It is to be feared, however, that his method will not meet with the approval of those who are in any degree inclined to be critical.

The author takes Mr. Stefánsson to task for using the transverse cephalo-facial and transverse cranio-facial indices as evidence of a Scandinavian or European infusion. He states that these indices are not *standard* and not those usually used in questions relating to race. Mr. Jenness goes on to inform us that "the best indications in regard to race, as far as physical measurements are concerned, are derived, according to the opinions of the leading anthropologists, from the stature, and the proportions of the length of the head to its breadth, i.e., the cephalic index."

Now stature would be valuable in studying a mixture between Eskimo and Scandinavians because there is a tremendous difference in the average stature of the two groups. Yet it is apparently not for this reason that it has been selected by Mr. Jenness. He selected it because "it is recommended by our leading anthropologists," but he does not seem to know what to do with it. He chooses one group, the Ammassalik Eskimo, as purest, and another, the Southwestern

Greenland Eskimo, as the most mixed. Because the Southwestern Eskimo are shorter than the Ammassalik he reasons that intermixture with Scandinavians would result in a group with a shorter average stature than either parental group. If this be true, it is certainly something heretofore unknown. All studies in human hybridization point to an opposite conclusion. Hybrids are either intermediate between the two parental stocks or taller than either parental stock. The fallacy of the method employed is of course the comparison of two separate groups. The logical method of deducing the effect of intermixture would have been to have compared mixed and unmixed members of the same group.

When Mr. Jenness found the Copper Eskimo 19 and 26 millimeters taller than the male and female Ammassalik Eskimo, he concluded that this evidence might almost be said to point against Scandinavian admixture. If we were to approve of the method of comparing two groups we could only conclude that the reverse is true. It should also be mentioned that intermixture with Indians would probably affect stature in the same direction as would intermixture with Scandinavians. For this reason evidence from stature alone would not be conclusive.

In fairness to Mr. Jenness, it should be said that he does not make much of the difference in stature and apparently did not expect much from it. Most of his faith has been put in the cephalic index. Using the same method of inter-group comparison he finds:

Ammassalik men	77.6	women	76.7
Copper Eskimo men	76.9	women	75.6

From this he concludes:

> The differences in the figures are so slight as to be practically negligible; they might, indeed, almost disappear if we had a greater number of cases to go by.

Ignoring the fact that the chances are just as great that the differences might increase 100 per cent, it is difficult to see what a strict coincidence would prove. Mr. Jenness does not tell us what result he expected from the intermixture of two long-headed groups. The range of the cephalic index is about the same in the Scandinavian and Eskimo. From this it is of course apparent that the cephalic index is perhaps the most worthless criterion that could be selected.

Whether or not the transverse cephalo-facial index and the transverse cranio-facial index are standard, it is a fact that they, together

with absolute width of face, have proved the most useful criteria of race mixture between mongoloid stocks and the white races. Professor Boas has repeatedly used them to good advantage. Doctor Jenks, in an elaborate study of Indian-White amalgamation, used the same criteria effectively.

In studying the results of intermixture of two groups one naturally selects those characteristics that are most widely contrasted in the two parental groups. In the case at hand the most obvious differences between the Eskimo and Scandinavians are pigmentation, stature, width of face (and consequently transverse cephalo-facial and cranio-facial indices) and the index of build. From an *anthropometric* standpoint absolute face width and the transverse cephalo-facial index are most satisfactory. There is a smaller amount of overlapping in the two groups in both of these characters than in most anthropometric traits. As stated above, the range and mean value for the cephalic index is practically identical in the Eskimo and Scandinavians and consequently we would not expect it to be altered in intermixture.

There is no universal standard for use in testing racial homogeneity. One thing is applicable in one case and another thing in another case. The cephalic index would be most useful in studying the effects of intermixture of Scandinavians and Lapps, North Italians and South Italians or the Apache and Pima. In studying the intermixture of most mongoloid peoples and whites we should preferably use absolute face width, absolute bigonial diameter or the transverse cephalo-facial index. If we were dealing with Negro-White intermixture we should probably select the nasal diameters and proportions. And so on. These other measurements and indices are just as standard as is the cephalic index.

In addition to criticising Mr. Jenness's selection of anthropometric criteria, I also object to his method of geographic comparison. By this I do not mean that the method is never valid or valuable. When we have a fairly complete and continuous geographical distribution of data such as exists for Sweden and Italy such comparison yields most conclusive results. But in comparing widely separated groups it is difficult to determine whether or not small differences are due to selection, environment, or intermixture. It is only when a mass of evidence points in the same direction that we can safely interpret it. The evidence under discussion is not of this type.

I do not wish to be understood as arguing for or against a Euro-

pean origin of "blondness" in the Eskimo. My criticism is confined to the method employed in trying to establish the truth or falsity of the theory. My point is that so far as anthropometric evidence is concerned the question of the European or non-European origin of "blondness" in the Eskimo stands exactly where it stood before Mr. Stefánsson and Mr. Jenness took up the discussion.

Let us hope that Mr. Jenness will give us a fuller presentation of the valuable data he possesses. It would be interesting if he could establish his three types anthropometrically. At least he should portray them photographically.

LOUIS R. SULLIVAN

FURTHER DISCUSSION OF THE "BLOND" ESKIMO

AFTER spending three years in the arctic and two of them among the Copper Eskimos for purposes of study Mr. Diamond Jenness returned in 1916 and has now published in the *American Anthropologist* a paper dealing mainly with their physical characters; after spending six years in the arctic and three of them among the Copper Eskimos, also for purposes of study, I returned in 1921 and, having now just read Mr. Jenness's paper,[1] I find some of the statements in it so much at variance with my own observations that I must call attention to them.

I do not follow Mr. Jenness in his reasoning about the head form of the Copper Eskimos, but if there is anything wrong with his scientific method (and it seems to me there must be) some one else will probably point that out.

But though lack of training may unfit me for judging Mr. Jenness in this particular, yet I am surely entitled to comment on his correctness of observation as to the "blondness" of the various Eskimo groups he deals with. Anybody is who has had the opportunity to examine the evidence and whose interest has led him to use his opportunities. I have had the opportunity, for I have seen every Copper Eskimo that Mr. Jenness saw and have seen most of them oftener. I have also seen many he did not see. I have had the interest leading to close observation—naturally, after being a member of one of the Stefánsson expeditions for three years and after reading his *My Life with the Eskimo*. Even before I went to the Arctic I had heard much debate as to whether there were any "blond Eskimos." I was from the first keenly on the watch for "tribal" differ-

[1] American Anthropologist, vol. 23, pp. 257–267.

ences in "blondness" between the various groups I saw in Alaska and Canada. My eyesight is good and I am not color blind. These qualifications fit me to pass on the main question of Mr. Jenness's paper—whether the "blond Eskimos" are markedly lighter in eyes, hair, beards, eyebrows, and skin than other Eskimos.

Stefánsson on his return from his second arctic expedition reported observing among the Eskimos of Prince Albert Sound and Minto Inlet (known as Kanghirgyuagmiun and Kanghirgjuatjiagmiun) a number of people having physical characteristics differentiating them from the Eskimos of the Mackenzie delta and Alaska. Through newspaper publicity these people received the name "blond Eskimos" though Stefánsson proposed for them (and for the rest of the people about Coronation Gulf) the name "Copper Eskimos," which name I note Mr. Jenness has adopted in his writings. Stefánsson also visited the Eskimos inhabiting southwestern Victoria Island and various parts of Coronation Gulf.

It was in Prince Albert Sound that Stefánsson observed the greatest amount of "blondness," this being less noticeable in Coronation Gulf and in southwestern Victoria Island.

Stefánsson sums up the physical characters of these people by saying: "Of something less than 1,000 persons, ten or more have blue eyes. Of those who have beards a good many have light brown ones. No one was seen with light hair of the golden Scandinavian type but some have dark brown and rusty red hair—the redness being usually more pronounced on the forehead than on the back of the head. Perhaps half of the entire population have eyebrows ranging from a dark brown to a light brown or nearly white; a few have curly hair."

Mr. Jenness without ever having visited the particular "tribe" in which Stefánsson found most of his blond people (Prince Albert Sound) states: "In summarizing the results in so far as they bear on the question of the blondness I have not considered it necessary to separate the Victoria Islanders from those of the mainland south of them." That Mr. Jenness sees no reason for differentiating between the peoples of the two districts amazes me no less after reading his arguments than before He certainly would have seen reason for differentiating them had he visited the Prince Albert Sound people.

During the winters of 1919–20 and 1920–21, I lived with the Kilinigmiun of S. E. Victoria Island. These people are in closer touch with the Kanghirgyuagmiun than are any other "tribe," as every summer the majority of them travel inland to hunt caribou and

meet the Prince Albert Sound people for trading and dancing. Nearly every year some of the Sound people spend the year with the Kilinigmiun and similarly members of the Kilinigmiun cross over to the Kanghirgyuagmiun. So I have had an opportunity of meeting and talking with a number of the Sound people. Of them three men and one woman have light grayish eyes spotted (in one case at least) with green. Another of them, about 25 years of age, has reddish brown hair, nearly straight eyes of a light hazel brown, and a reddish moustache. He resembles a young German American friend of mine very closely. A boy of about fifteen has very fair skin, rosy cheeks, medium brown hair, and rather light brown eyes.

To sum up my observations I will say that there is a noticeable difference as regards the color of hair, eyes, eyebrows, and beards, between Prince Albert Sound people and any other Eskimos I have seen, and I have seen numerous persons from nearly or quite every Eskimo "tribe" from Bering Straits east to the southeast corner of Victoria Island. It is common knowledge among the natives of Coronation Gulf that their neighbors living to the north of them are much fairer than they. I have often heard them remarking about it.

I have at various times associated with Eskimos native to Alaska and the Mackenzie who have visited Prince Albert Sound either aboard whaling ships or as members of one or another of Stefánsson's expeditions. It is a commonplace among these western Eskimos that the Prince Albert Sound people differ from the western Eskimos and more nearly resemble white men.

It appears, however, that Mr. Jenness did see "sixteen light-eyed Copper Eskimos." He explains that this light color in their eyes is due to repeated attacks of snow-blindness. During six years and six months of close association with the Eskimos of Canada and Alaska I have never seen or even heard of a single case where a man's eyes turned blue from attacks of snow-blindness and I know of no reason why they should. But if snow-blindness turns brown eyes to blue or gray, have we any reason for believing that the Copper Eskimos are more susceptible or more exposed to snow-blindness than other Eskimos? Prince Albert Sound, Coronation Gulf, and Alaska have about the same conditions of light. The people shield their eyes with about the same mechanical protectors and have about the same precautions and beliefs that surround snow-blindness. Then, if the light eyes come from snow-blindness (and the light hair from sun

bleaching presumably) why do we find much "blondness" in Prince Albert Sound, medium blondness in Coronation Gulf, and little if any in Alaska? Of course Mr. Jenness says there is about as much blondness in one place as another, but this is flatly opposed by my observations and the opinion of the Eskimos themselves.

Mr. Jenness says that the Copper Eskimos have eyebrows "so sparse that it was difficult to detect their real color." I have not noted that the Copper Eskimos have eyebrows more sparse than the Alaska Eskimos and am inclined to the opposite view. But I have noted that the Copper Eskimo eyebrows are less conspicuous because they are lighter in color. The dark brown or black eyebrows of the Alaskans naturally stand out conspicuously.

So far as I can trust my eyes with regard to the people I saw, (which includes those seen by Mr. Jenness), so far as I can trust my knowledge of the Eskimo tongue (and I speak it now nearly as fluently as English), I know the following to be true:

First: The Prince Albert Sound Eskimos (whom Mr. Jenness says he did not see) have a higher percentage of "blondness" than the Coronation Gulf people, and the Gulf people have a higher percentage than the Mackenzie and Alaska Eskimos. I observed this and I heard the Eskimos say that they also had observed it.

Second: I know no influence—environment, local custom, or any other—that would expose one of the above peoples more than another to snow-blindness or any post-natal influence that might cause a change in eye color, hair color, or "slant" of eyes.

My observations on these points then agree with Stefánsson rather than with Mr. Jenness. H. H. NOICE

Postscript

Alfred H. Anderson has lived on the Yukon, Alaska, and in northeastern Siberia since the time of the 1898 gold rush. He spent among the Copper Eskimos the years 1916–1921 with Captain Joseph Bernard, who is mentioned in Mr. Jenness's "Life of the Copper Eskimos," (published at Ottawa in 1922, as part of the report of the Canadian Arctic Expedition of 1913–18).

Mr. Anderson saw all the Eskimos seen by Mr. Jenness as well as a good many others in that vicinity. The views expressed and the observations published by Mr. Jenness were so surprising to me that I wanted to get the opinion of someone else who also had seen the same people. I accordingly wrote to Mr. Anderson and have just received a letter in which he says: "Regarding the report of Jenness,

I must say that I think it very improbable that snow-blindness would cause brown eyes to turn blue. How does he explain the beards, hair and features similar to those of white people? Are they also caused by snow-blindness?"

H. H. N.

A Letter from Dr. Gamio

The following letter has been received by the President of the American Anthropological Association:

A la H. American Anthropological Association:

He recibido copia de la resolución leída en las minutas de esa respetable Sociedad referente a los trabajos arqueológicos efectuados en México por la Dirección de Antropología y especialmente a los de Teotihuacán y Templo Mayor de Tenoxtitlán, firmada por el Presidente de la misma, Dr. W. C. Farabee, y Secretario, Dr. A. V. Kidder.

En mi calidad de Jefe de la Dirección de Antropología y en nombre de los empleados que la forman tengo el alto honor de expresar nuestros profundos agradecimientos por la distinguida y fina atención que han merecido sus modestas labores por parte de esa respetable y culta Sociedad.

Es muy alentador para nosotros que los sabios americanos nos estimulen con su bondadosa aprobación. Nuestros esfuerzos serán mayores en lo sucesivo contando con su buena voluntad y apoyo moral.

El Director de Antropología,
M. Gamio

BRIEF COMMUNICATIONS

Notes on State Archaeological Surveys

(From the report of the Committee on State Archaeological Surveys, National Research Council, Clark Wissler, Chairman)[1]

About two years ago the National Research Council appointed a committee to consider the stimulation of State archaeological surveys in the United States. Attention was first directed to the Mississippi Valley, especially to the States of Indiana, Illinois, Iowa, and Missouri. In Indiana the State Academy of Sciences and the Historical Society appointed a State committee to cooperate, viz., Dr. Frank B. Wynn, Dr. Stanley Coulter, Judge R. W. McBride: for Illinois and Iowa similar State committees; Illinois, Dr. Berthold Laufer, Dr. Otto L. Schmidt, Dr. Charles L. Owen; Iowa, Prof. B. F. Shambaugh, Dr. E. R. Harlan, E. K. Putnam. The Missouri survey was initiated by the Anthropological Society of St. Louis and is under the direction of the following committee representing a number of societies and institutions: Dr. R. J. Terry, Leslie Dana, B. M. Duggar, R. A. Holland, George S. Mepham, Dr. H. M. Whelpley, J. M. Wulfing, Dr. C. H. Danforth. Satisfactory progress has been made in each of these States. The Indiana Survey is by the State under the direction of the State Geologist. In Iowa the work has begun under a grant from the Iowa Historical Society; in Missouri under a fund raised by the above-mentioned committee. As the results of all these surveys will be published, the outlook is stimulating.

In the course of its labors the National Research Council committee accumulated some information as to progress in a number of States, a digest of which is given here over the names of the organizations reporting. These reports are for the year 1921.

Alabama. A survey of the State has been initiated by the Alabama Anthropological Society, for whose history and work see pp. 489–492 of the last volume of the *Anthropologist.*

[1] As first organized this committee was headed by Professor Roland B. Dixon, but was later reorganized as follows: Clark Wissler *Chairman*, Roland B. Dixon, F. W. Hodge, Berthold Laufer, Amos W. Butler.

It is the purpose of the Society gradually to map every section of the State, to visit and survey every known site, when many others will be located, to record before it is too late the observations of all living persons in the State on its aboriginal people and customs. As one feature of its historical activities, each county in the State is being surveyed and studied for the purpose of recording all present-day places and place names which show in their etymology an aboriginal suggestion.

One feature of the work for 1922 is a reconnaissance of Russell and Lee counties in the eastern part of the State, in the old Creek country, at which time every school in the two counties will be visited, lectures will be given, and a collection of archaeological objects will be shown. A photograph of every mound and town site in each county will be made, and information gathered for the purpose of adding to the known history of the county as it applies to aboriginal times and conditions.—Alabama Anthropological Society, Peter A. Brannon.

Arizona. A systematic survey of the State and its environs is planned as a part of the scientific work of the University of Arizona and the State Museum. The work of the Director for the year 1920–1921 was as follows:

June to September, 1920, were spent in northern Arizona continuing the investigations of mesa pueblos and the pueblos of the great natural caves of the region. Some unexplored side canyons in the Segi and Nitsi groups in the northern part of the State were visited and ruins located. One cave pueblo in Bubbling Spring branch of the Segi was further excavated and material of the earlier cave people found beneath that of the so-called Cliff Dwellers. Some cave pueblos on Black Mesa near Kayenta were found and excavated. The region west of Navajo Mountain was further explored and a large pueblo found on Tayenda Mesa, a long, narrow, and lofty table-land stretching between Navajo Mountain and the Colorado River.

A field course of six weeks in the study of cliff pueblos was given during July and the first part of August. Several week ends during the year were spent in excavating and studying valley pueblos on a branch of the Gila River near Christmas, Arizona.

The summer of 1922 will be spent in the study of cliff and mesa ruins in southeastern Utah and the region lying west of Navajo Mountain. We are trying to complete the survey of northern Arizona

east of the Colorado River and of southeastern Utah.—University of Arizona, Byron Cummings.

California. Since 1901 the Department of Anthropology of the University of California has more or less systematically prosecuted archaeological survey work in the State. The Department was instituted to promote research, publication, academic instruction, and museum formation along the lines of archaeology, ethnology, and linguistics. Its local archaeological efforts have been therefore intertwined with its other activities. Among research students specializing in archaeology have been J. C. Merriam, Uhle, Nelson, Loud, and Outhwaite, from the pen of most of whom monographic reports have been issued. There is in the possession of the Department a much larger body of data, in the shape both of information and museum collections, than those already issued or described. The need at the present time is for a student who can for some years give all his time, or the greater part of it, to synthesizing the data already accumulated, with the supplement of new survey or expeditionary work at special strategic points. The present staff of the Department is too heavily engrossed with other duties to prosecute this work as it deserves. The means needed for further exploration could probably be supplied with little difficulty. The prime desideratum is a properly qualified man to take hold of this work without being distracted by other claims. There would be here a splendid opportunity for a volunteer. The materials already in hand are really quite considerable and the attitude of most citizens of the State is such that very cordial cooperation may be obtained from them.—University of California, A. L. Kroeber.

Colorado. In the fall of 1920, the Board of Directors of the State Historical and Natural History Society of Colorado, realizing the importance of research along archaeological lines, resolved to create a Section of Archaeology and Ethnology in the Society. At that time there were no funds available to carry on any active work, but an appeal sent to friends of the Society resulted in a small amount which seemed to justify engaging a man to take over the work. So, on March first, Mr. J. A. Jeançon, then Special Archaeologist in the Bureau of American Ethnology, Smithsonian Institution, assumed direction of the work in Colorado.

In conjunction with the University of Denver, the State Historical Society sent an archaeologial expedition into Archuleta County, twenty-two miles west of Pagosa Springs. The results of this expedi-

tion have not been fully realized as yet, as there has not been sufficient time to study all of the material at hand, but this much is known: that the Pagosa-Peidra region is one of great archaeological importance. One of the most important results obtained has been the discovery of a sequence in house construction that is so well defined that, in the main, the consecutive steps can not be mistaken, from the earliest type of pit house to the large community house. New types of pottery, a definite system of decorative zones on the pottery, and many other features make this new field one of importance.

For 1922 an attempt will be made to make a complete archaeological survey of Archuleta County, as well as excavations at one or more sites of especial interest.—State Museum, Colorado, J. A. Jeançon.

Illinois. The Committee for this State is not ready to initiate a regular survey, but work was begun on the Cahokia mound group in 1921 by Warren K. Moorehead to stimulate general interest. As a result, the University of Illinois has come to the support of the work on Cahokia, which it is hoped will develop into a definite State program.

Indiana. During the past year we have undertaken an archaeological survey of Indiana to be carried on in connection with our survey of the natural economic resources of the State. We have covered about four counties in the field and located all of the archaic deposits which we were able to find. This survey was very thorough, as we covered the territory section by section. We have also prepared a map, showing all of the known archaic deposits of the State and, in connection with the Historical Commission, have prepared a questionnaire to be sent to people interested in either historical or archaic research, requesting that any information which they have in reference to historical or archaic deposits be sent to the two departments respectively. We are also preparing county maps which will be sent to these parties, asking them to make definite location of all such deposits on these maps.

Aside from this work we have also during the year carried on some special investigations, having excavated one mound in Lawrence County and obtained a skeleton that is in a very good state of preservation, nearly all parts having been collected. This mound was laid out in the form of a square, the lower part being divided into vault-like areas by the use of pieces of a thin-bedded limestone. The skeleton was obtained from one of these vaults. The upper

portion of the mound consists of loose sand, in which bodies had been buried promiscuously. We are not at the present moment ready to make a suggestion as to the age of the skeleton obtained but believe it to be much older than the time of burial of the remains of the more recent Indian occupants of Indiana.—Division of Geology, Department of Conservation, W. N. Logan.

Kansas. There are important archaeological remains in Kansas to be investigated and determined. In the fourteenth volume of the *Kansas Historical Collections* is an article on the "Early Indian Occupancy of the Great Plains." We suspect that all of the Great Plains country was once occupied by the Caddoan linguistic family, but a matter of this nature must be settled finally by a study of archaeology. Unfortunately, few facts in that field are available. We have not made even a beginning in this Society, being hampered for want of funds. Though we have many archaeological specimens and some of great value, no classification has been made and no means provided for exhibiting them. Yet Kansas is rich in archaeological remains.

On the side of ethnology the writer has done most of the work in the State, having gathered all of the Wyandot linguistic material which could be obtained from the Wyandots now living, or living within the last thirty years, the whole forming a manuscript of some 200 pages. Also, a brief Shawnee vocabulary was obtained from David De Shane who lived near Seneca, Missouri, but who had lived at one time in Wyandotte County, Kansas, when the Shawnee occupied that country. In the writer's *History of Kansas* is a chapter on the Indians once inhabiting this State.—Kansas State Historical Society, William E. Connelley.

Nebraska. Nebraska has been interested in the archaeology of the State for some years. A systematic survey of the eastern third of the State has been accomplished through the office staff of the Nebraska State Historical Society and charts of many of the village sites have been made. Descriptions and the known history of these sites have been printed in various reports and the Museum contains numerous relics found on them.

The flint quarries at Nehawka in the eastern part of Nebraska have been studied and a cross-section of one quarry pit has been made. The flint deposits on the Republican River in the southwest part of the State have been studied. The ruins of ancient villages near Fullerton in Nance County, have been explored and a few of the

many "mound houses" have been cross-sectioned for study. We hope, in the near future, to take up a systematic study of the area immediately west of this explored area and continue to the western line of the State. Many isolated points as far west as North Platte have been reported, but there are others in the same area which will be explored and plotted at the same time.—Nebraska State Historical Society, E. E. Blackman.

New England. About the year 1912 plans were made for intensive work in the State of Maine, the region being unknown except through Willoughby's, Loomis's, and Young's researches. Our field parties traveled by canoe, a plan that might not work outside of New England, but we found it very satisfactory here. In fact, better results are obtained by moving down a river in canoes than by proceeding by automobile. We have tried both methods. Exploring by means of canoes has its distinct advantage in that one is traveling as the Indians did and is apt to find more sites than when following the various roads, most of which are back from the water. We generally went to the head of a river and worked down. This was preferable to ascending a stream. Along the seacoast we used motor boats or other larger craft.

The above is our detailed method of procedure. We mapped all our sites on United States Geological Survey sheets. During the winter we examined books, colonial or museum records, for sites others had found or historic Indian sites, and entered these. Many local societies and individuals cooperated with us in these compilations. In all eight seasons were given to this survey, the results of which have been recently published.

The past year we had a small appropriation and did not attempt field-work although the writer visited various museums and societies in Massachusetts and Connecticut and arranged for cooperation next year. The spring and summer of 1922 we expect to do considerable work in Connecticut and southern Massachusetts. We will not attempt thorough exploration of a given area but rather ascertain where the large sites are, test several of them, and do more extensive work in future years. Local societies will probably furnish part of our transportation, but in the main we will depend on canoes.—Warren K. Moorehead.

New York. New York began its survey of the archaeological localities within its borders in 1905, leading in 1906 to the establishment of the office of Archaeologist of the State Museum. The work

is financed from the appropriations made for the New York State Museum and the material results deposited in its collections.

Three plans have been followed, though in reality all three are interrelated. The Museum began by exploring and excavating important sites without regard to culture. If a site seemed of special interest and likely to yield information and artifacts it received the attention of the season. The second plan was to group sites according to their culture and to explore specific areas. The third plan has been to list all of the known sites in the State and to search for others, so far as possible making a note of the probable culture.

As a result of this work the survey has determined the general localities and the chief characteristics of several occupations. The latest is the historic Iroquois in central and western New York and the Algonkian along the coast. Using these as datum we have been able to chart the successive occupations of the several areas within the State. By general areas, these are broadly as follows. (In reading these lists note that the higher the number the earlier the date.)

Western New York

1. Historic Iroquois (Seneca), tributary Algonkian peoples
2. Seneca and others who followed the Erie and Neutral
3. Erie, Neutral, Seneca, Iroquoian indeterminate
4. Algonkian, various tribes
5. Earth-work builders with pottery between Algonkian and Iroquoian
6. Mound-Builder-like sites
7. Algonkian (?)
8. Early Algonkian (?)
9. Indeterminate

Central New York (south to the Pennsylvania line)

1. Historic Cayuga, Onondaga, and Oneida
2. Andaste in the south along the Susquehanna and tributaries
3. Algonkian about the Finger Lakes
4. Mound-Builder-like
5. Algonkian
6. Early Algonkian
7. Algonkian (?)
8. Eskimoan (?)
9. "Red Paint" (?)
10. Indeterminate

Northern New York and Mohawk Valley

1. Iroquoian (in Jefferson County, early Onondaga)
2. Algonkian
3. Early Algonkian
4. "Red Paint" (?)

5. Eskimoan (?)
6. Indeterminate

(Contemporaneous with 3, in the Mohawk Valley there were "stone grave" people.)

Southern New York and Coast

1. Algonkian tribes
2. Iroquoian influence
3. Pre-Colonial Algonkian (Iroquoian traces)
4. Early Algonkian, certain Eskimo-like traces (?)
5. Indeterminate

Much remains to be done in the State, but with only one member of the archaeological staff and occasional field helpers, often without training, the task of making the survey seems a severe one; notwithstanding, the results have amply repaid the effort.—New York State Museum, A. C. Parker.

Ohio. The specific aims of our State archaeological survey as projected and carried out in past years are to work out the various cultures formerly occupying our State and to trace them from the time they came into the State through the various river valleys. By tracing out the inhabitants of the Paint Creek valley, for instance, and comparing these inhabitants with others of the State we will be able, no doubt, to trace their movements. Our examination of the Tremper Mound on the lower Scioto, the discovery that the great Hopewell culture was represented there, and a study of the mound and use of the site led me at once to surmise that the work at Mound City by Squier and Davis was not complete, and this caused me to take steps to secure these mounds. We fully expected to be compelled to condemn the property in order to take possession, but, the war coming on, the Government took the property for Camp Sherman. As soon as the Government had charge of it, we at once solicited the aid of the War Department in carrying out our project of examination, which Department did all within its power to help so that in the end we were able to examine in toto the entire mound group. Later the Department turned over to us the site of the Mound City Group to be made into a free public park. The mounds will now be fully restored in accordance with the early surveys and thus made accessible to visiting archaeologists.

As stated before, the aim of our State archaeological survey is to work out as many of these great sites as possible and to that end we have arranged for our next year's work in the Paint Creek valley, particularly the Seip Group. The mound we anticipate working upon

is 250 feet long, 150 feet wide, and upwards of 30 feet in height. We believe that the examination of this particular mound will give us new ideas concerning the Hopewell culture.—Ohio State Archaeological and Historical Society, W. C. Mills.

Tennessee. A general survey of the State has been conducted by Mr. W. E. Myer with some assistance from the Bureau of American Ethnology. All of the known sites in the State have been mapped and descriptive notes for the same prepared for early publication.

Wisconsin. The Wisconsin Archaeological Society, founded in 1899, is a trustee of the State and has at present a membership of about five hundred of the most representative men and women of the State. It is cooperating with all of the various scientific and educational organizations and institutions of Wisconsin.

Meetings are held in the Milwaukee Public Museum, Milwaukee, on the third Monday of each month from October to June. Illustrated lectures are given at each meeting. Sectional field meetings are held during the summer at Silver Lake, Waukesha County; Devils Lake, Sauk County; and Koshkonong, Jefferson County.

Archaeological surveys have been completed in the Lake Monona region in Dane County, at Rock Lake in Jefferson County, and at Fox Lake in Dodge County. Surveys and researches have been continued in Columbia County, at Lake Kegonsa in Dane County, and in the Silver Lake region in Waukesha County. Additional archaeological data have been collected in Burnett, Clark, Wood, Kenosha, Waukesha, Door, Winnebago, and other counties.

Mounds have been explored at Crystal Lake in Columbia County, Rock Lake (at Lake Mills), and near Kingston in Green Lake County.

The following mounds have been permanently preserved: A group of twenty-eight conical, linear, and effigy mounds on New State Soldiers' Hospital grounds, Farwell Point, Lake Mendota; a panther type effigy mound on the Y. M. C. A. camp ground, Morris Park, Lake Mendota; a group of ten conical, linear, and effigy mounds on the new Black Hawk Country Club grounds at Mendota Heights, all in Dane County; a conical mound in the public park at Little Clam Lake, Burnett County; a row of conical mounds at Aztalan, Jefferson County.

Three mounds have been marked with metal tablets: Lynx type effigy mound in Devils Lake State Park (June 11); Turtle Mound on Milwaukee County Boy Scout camp grounds, Silver Lake, near Oconomowoc (July 17); bird effigy on Hoard Hotel grounds, Lake Koshkonong (August 26).

Lectures have been given on the Wisconsin Indians and on archaeology during the summer session of the University of Wisconsin, and the State Historical Museum has conducted an annual archaeological excursion of students. Other items of interest are the assumption by the Winnebago County Archaeological and Historical Society of entire charge of the Oshkosh Public Museum, and the removal of the Potawatomi "Spirit" stone from Superton, Forest County, to Madison for preservation.—Wisconsin Archaeological Society, Charles E. Brown.

Meaning of the Word Dakota

Much speculation and discussion have been given to the possible meaning of the word "Dakota," the name of the most numerous and important nation of the Siouan linguistic stock. Most commonly it has been said that it means "allies" or "friends." From even a slight consideration of the etymology and of the native use of the word it would appear that it can not mean "friends" in the ordinary sense of the term. And even more certainly it can not mean "allies," for it refers only to the people of the one nation, and not to any alliance of nations. At all events it is a word so ancient that its derivation is difficult to trace. It may be that some light on its origin and meaning may be shed by philological comparison of the Dakota language with its cognate languages, for example the Omaha. This line of inquiry suggested itself to me upon finding in a very ancient Omaha song a word which appears to be very closely related in use and meaning with the Dakota word *dakota*. The Omaha word in question is *endakutha*. It occurs in some of the songs of a very ancient and strictly limited society in the Omaha tribe, called the Pugthoⁿ Society. The Pugthoⁿ was a society of chiefs. It ceased to exist about the middle of the nineteenth century. One of the songs of the Pugthoⁿ is "Endakutha wahatanga eame." The word meaning "friend" in common use in the Omaha language is *kageha;* but it is said that this word *endakutha* is an ancient and obsolete word for "friend," that it is the word for "friend" in the sacred priestly language. The exact meaning of the word is now lost. A word for word translation of the ancient song just quoted is "Endakutha (friend) wahatanga (shield) eame (they say, or it is said)." From this it might appear to be in the form of eulogy of some person by the name of Wahatanga as a friend (of the people), or as declaring that a friend is a shield. Or

possibly the real meaning is not either of these, but there may be a third rendering. On this point more will be said presently.

Another ancient Pugtho[n] song is

Ouhan thete nide tho.
Endakutha nide tho.

It is said this song was always sung before the waiters served the food at a feast of the Pugtho[n] Society. The word *ouhan* means "cooked"; *thete* means "this"; *nide* means "change or transformation in water by means of heat"; *tho* is simply the rhetorical sign of the close of the sentence; *endakutha*, as was said above, is an obsolete word of the ancient Omaha language, or a word of the Omaha sacred language, meaning "a friend." The rendering "Friend, the food is cooked" has been offered as a translation of the song "Ouhan thete tho. Endakutha nide tho." But this hardly seems to be an adequate rendering of the meaning and content of the words of the song, for it claims to render in the statement of one sentence what required two sentences in the original. Such a rendering seems to be without rime or reason. It seems to me the secret may be that we have in this song an example of versification in Omaha poetry by the rhythm of parallelism, a couplet the first member of which gives a statement of obvious fact set off against a statement of mystical fact in the second number.

On finding that the ancient Omaha word *endakutha* meant friend or friends, or possibly an association of friends or of persons of kindred spirits, it occurred to me that there might be an affiliation in origin and signification between this obsolete Omaha word and the equally ancient word *dakota* in the Dakota language, a language which is cognate to the Omaha. The form and sound of the word *dakota* suggested its possible kinship to the word *endakutha*. Then I thought of the modern Dakota word for friend, namely *koda*, which becomes *kola* in the Teton or western dialect. Then I thought of the regular consonantal sound shifts which do occur in strictly regular order throughout the range of dialects of the Dakota language and of the Omaha language, as *d* in the eastern or Santee-Dakota dialect becomes *l* in the western or Teton-Dakota dialect, and *th* in the Omaha language. For example, the word *mdaska* in the Santee dialect becomes *blaska* in the Teton dialect of the Dakota language and *bthaska* in the Omaha language.

Now let us again consider the song

Ouhan thete nide tho.
Endakutha nide tho.

Here we have two sentences in each of which the predicate is the same word *nide*. In the Dakota language the word *nide* is found also in ancient usage, and it has reference to the property which water has of self-transformation in the presence of varying degrees of temperature into solid, liquid, or vaporous form while remaining the same essential substance. This appeals to the mind as a mysterious property. Now the first verse of the Omaha couplet, "Ouhan thete nide tho" is rendered "This food is cooked (by boiling)," i.e., changed or transformed. This is a statement of an obvious fact. The second verse of the couplet, "Endakutha nide tho," appears to be a parallel verse. But what is the meaning? If it simply means "A friend (or friends) is changed (or transformed)," it does not seem to make any sense. But how will it be if taken as a statement of a mystical fact set off in parallel with the obvious fact stated in the first verse? In that case both the words *endakutha* and *nide* must be taken in their mystical sense. In this sense what shall be the meaning? So interpreted *endakutha* would have, not the obvious meaning of friend or group of friends, but a concord or sodality of persons united in the bonds of a mystic fraternity, a select group or class, a chosen people.

And in the mystic sense of the word, *nide* as applied to this mystic fraternity may well signify the inherent property of this select group of people, in the presence of the mysterious Power in which they rest and confide, to do and accomplish wonderful things, and beyond ordinary expectations, or, as expressed by the Apostle Paul in his second letter to the church at Corinth, "to be changed from glory unto glory."

Now let us again consider the meaning of the first song quoted, namely, "Endakutha wanatanga eame." The literal meaning would appear to be either "It is said Endakutha is a shield," assuming that Endakutha is the name of a hero who is acclaimed as a shield or protector of the people, or else we may take it to mean "It is said (or they say) Wahatanga is a friend (of the people)," granting that Wahatanga is the name of a popular hero. But neither of these obvious renderings would seem to be adequate to the purpose of a song to be used in the celebration of a solemn religious ceremony such as was this feast of the Pugtho[a] Society. But if we render it according to the mystic sense of the words it may well be a devotional hymn in worship of the divine Power on which the chosen people Endakutha, depend, and under whose protection they are preserved, and by whose strength they endure and prevail. In this sense the meaning

may be "It is said (the divine Power) is a shield to the chosen people," or "They say (the divine Power) is a shield to the chosen people," or "Let all now say (the divine Power) is a shield to the chosen people"—Endakutha (the chosen people), wahatanga (shield), eame (they say). Thus it may be a devout expression similar to that of the Hebrew psalmist when he sang "Jehovah is my strength and shield," or again when he sang "Thou, Jehovah, art a shield about me," or again "O Israel, trust thou in Jehovah: He is their strength and shield."

From my study I conclude that the word *dakota* of the Dakota language, and *endakutha* of the cognate Omaha language, both being very ancient words, are derived from the same root, and that they do contain the concept of a group or society of friends, but not in the ordinary sense of the word friend, rather in the mystic sense of a peculiar people.

MELVIN R. GILMORE

ANALYSIS OF PRE-COLUMBIAN PIPE DOTTELS

THE American origin in and pre-Columbian use of tobacco has recently been questioned. It occurred to the writers that definite evidence in the matter might be secured by the analysis of the dottels remaining in ancient pipes. Although a number of chemists who were consulted about the matter stated that the chances were very small that any nicotine which might once have been present could survive for so long a period, the experiment of having a chemical analysis made seemed worth while.

The material selected comprised two dottels from Basket-Maker pipes kindly contributed by the Museum of the American Indian, Heye Foundation, together with the "cake" from a pipe excavated by the Peabody Museum Expedition from a Basket-Maker site at Savodneechee, Arizona. The material was given to a well-known firm of analysts, who made a very careful chemical and microchemical investigation. The preliminary tests gave what appeared to be a faint indication of nicotine, but further corroborative tests by other methods failed to confirm this, and the report concluded by stating that "we are forced to conclude as a result of a thorough and exhaustive investigation that none of the samples you sent us contains any nicotine."

The result of the experiment was thus wholly negative, and the analysis neither proves that tobacco was smoked in these ancient

pipes, nor that it was not smoked, since the failure to detect nicotine may be due to the fact that it was not tobacco which was smoked, or to the fact that the nicotine derived from tobacco which had been smoked had wholly disappeared in the course of time.

Although the experiment was thus inconclusive, it was thought of some interest to put on record what is believed to be the first analysis of this sort.

ROLAND B. DIXON
JOHN B. STETSON, JR.

ANTHROPOLOGICAL NOTES

Organization of a Central Section of the American Anthropological Association

The first meeting of the Central Section of the American Anthropological Association was held at the Field Museum of Natural History, Chicago, Illinois, on April 21, 1922. Dr. Berthold Laufer, as chairman of the Provisional Committee, extended a word of welcome to the meeting and recited briefly the events which have led to the formation of a branch or section of the American Anthropological Association in the middle west. The organization of local branches in affiliation with the parent Association was authorized by an amendment passed by the American Anthropological Association at its Brooklyn meeting. The purpose of the Central Section is to unite persons interested in anthropology who reside in the middle west, to provide them with a medium for regular meetings, to promote the cause of anthropology in general, and to stimulate research in the archaeology and history of the middle west in particular.

The morning session was devoted to organization and the election of officers. A constitution was adopted, and the following officers elected: *President*, S. A. Barrett, Director Public Museum, Milwaukee; *Vice-Presidents*, W. C. Mills and Chas. E. Brown; *Secretary* and *Treasurer*, Ralph Linton;[1] *Council*, Berthold Laufer, Frederick Starr, Alanson Skinner, George R. Fox, L. B. Wolfenson, Chas Owen, Chas. G. Schoewe, E. K. Putnam, Chas. R. Keyes, Edward Sapir, M. R. Gilmore, A. E. Jenks, and Hutton Webster. Berthold Laufer, Frederick Starr, Alanson Skinner, George R. Fox, and L. B. Wolfenson were elected to form an executive committee to cooperate with the officers in the management of the Section.

Votes of thanks were extended to the Field Museum of Natural History, to the Department of Anthropology of that Museum, and to Berthold Laufer, Otto L. Schmidt, and Edward E. Ayer. The members of the Central Section then adjourned for luncheon at which they were the guests of Edward E. Ayer.

[1] The position of Corresponding Secretary, provided for in the constitution is left vacant for the present, the duties of the office being performed by the Secretary-Treasurer.

The afternoon session was devoted to the reading and discussion of two papers, one by Fay-Cooper Cole on his projected trip to Borneo and Sumatra under the auspices of the Field Museum of Natural History, and the other by Ralph Linton on the results of the Marquesan Expedition of the Bishop Museum of Honolulu, Hawaii.

Prof. Frederick Starr of the University of Chicago then took the members to the building of the Chicago Academy of Sciences, where he gave an interesting talk on a collection of souvenirs of Mount Fuji (maps, color prints, paintings, and books) obtained by him in Japan and temporarily exhibited in the rooms of the Academy.

The members of the Section then adjourned to the Union League Club for dinner, where they were the guests of Dr. Otto L. Schmidt. After dinner the Section was reconvened, and Dr. Otto L. Schmidt elected an honorary member.

The Section then visited the building of the Chicago Historical Society, where Milford G. Chandler exhibited his collection of Indian objects and rendered selections of Indian music on the flute.

An offer of the use of the Field Museum of Natural History as a permanent headquarters for the Central Section, made by Mr. D. C. Davies, Director of that institution, was accepted by the Central Section.

The new organization has been well supported by middle western Anthropologists. On Aug. 1st it showed an enrollment of thirty-two members. Seventeen of these are former members of the American Anthropological Association while the remaining fifteen have not previously been connected with that organization.

Constitution of the Central Section of the American Anthropological Association

1. *Name and Purpose.* The name of the organization shall be the Central Section of the American Anthropological Association. Its purpose shall be to promote the cause of anthropology by means of a closer fraternization of the students in the central states.

2. *Officers.* The officers shall be a president, two vice-presidents, a secretary-treasurer, and a corresponding secretary, to be elected at the annual meeting for a term of one year. There shall be a council of not more than twenty members elected annually. From this council five members shall be elected to form an executive committee. The management of the Section shall be vested in an Executive Council consisting of the officers and executive committee.

3. *Membership and Dues.* There shall be two classes of members. Members of the American Anthropological Association resident in the

middle west may become members of the Central Section by signifying to the Secretary their desire to be enrolled in it. They are exempt from dues to the Central Section. In joining the Central Section they forfeit none of their rights and privileges as members of the parent Association.

Persons who are not members of the American Anthropological Association, and who do not wish to join it, are eligible as Associate Members of the Central Section. Their election must be confirmed by the Executive Council. They are permitted to attend all meetings of the Section, but can not vote and are not eligible as officers. The dues for Associate Membership shall be one dollar ($1.00) a year, payable in advance. Associate members may become regular members at any time by joining the American Anthropological Association.

4. The Central Section is autonomous in all questions pertaining to its own organization and affairs, and is free in the choice of time and place for its meetings. It shall recognize and support the *American Anthropologist* as its medium of publication, and the *American Anthropologist* shall publish a report of the proceedings at its meetings.

5. The secretary-treasurer of the Section shall be empowered to submit to the treasurer of the American Anthropological Association vouchers for the necessary expenses countersigned by himself and the president of the Central Section which shall be honored by the treasurer of the parent Association. Such expenses shall in no case exceed one dollar ($1.00) a year for every enrolled member who is a member of the American Anthropological Association.

6. At least one meeting a year shall be held at a time and place to be designated by the Executive Council. The rules and precedent of the American Anthropological Association shall govern such meetings. Additional meetings may be held at the discretion of the Executive Council.

American Anthropoids

At the April meeting of the National Academy of Sciences Dr. Henry Fairfield Osborn announced the discovery by Mr. Harold J. Cook, consulting geologist, of Agate, Nebraska, of what appeared to be the tooth of an anthropoid, an order of animal life hitherto supposed to be entirely wanting in the New World. Upon receipt of this tooth from its discoverer it was examined by Dr. Osborn and Dr. William D. Matthew and later examined and reported upon by Curator William K. Gregory and Dr. Milo Hellman, who concluded that "on the whole we think its nearest resemblances are with '*Pithecanthropus*' and with men rather than with apes." On the basis of these very careful studies Dr. Osborn decided to make this tooth the type of a new genus and species, *Hesperopithecus haroldcookii*. This discovery constitutes an event of the utmost importance for the science of anthropology no less than for geology. Future developments will be watched with keen interest.

"AN important contribution to the controversy over the Piltdown Skull was made by Profs. Elliot Smith and Hunter at a meeting of the Anatomical Society held on May 12, when they exhibited a reconstruction of the skull and its endocrinal cast. The reconstruction has been made by a careful and minute examination and correlation of the anatomical points of the fragments of the skull. The result confirms generally the reconstructions made by Dr Smith Woodward and Mr. Pycraft when first the skull was discovered, and agrees in showing the remarkable breadth of the skull and its low capacity, which is, in each case, placed below 1300 c. c. This later reconstruction, however, differs in one important particular. The occipital fragment assumes a more vertical position, with the effect that the skull is brought into closer relation with the skull of the anthropoids. As a result, the cranium falls into complete harmony with the chimpanzee-like jaw, and the paradox which has hitherto been a stumbling-block to the acceptance of the jaw as indubitably belonging to the fragments of the cranium now disappears."—*Nature*, June 3.

DURING July, A. I. Hallowell was enabled to continue his linguistic and ethnological investigation of the St. Francis Abenaki through the generous support of Messrs. George G. Heye and Frederick S. Dickson of New York, Vance C. McCormick of Harrisburg, F. H. Goff of Cleveland, and the Anthropological Society of Philadelphia.

MR. A. RADCLIFFE BROWN, known for his anthropological researches in West Australia and the Andaman Islands, has been lecturing during the past yeat at the University of Cape Town, where he holds the position of social anthropology. He is also honorary curator of ethnology at the Transvaal Museum.

MR. N. C. NELSON has left for Europe, where he will visit the chief centers of archaeological research in the interests of the American Museum of Natural History. His itinerary includes Norway, Sweden, Spain, and Belgium.

ON June 8 Dr. T. T. Waterman returned to Washington from field work for the Bureau of American Ethnology among the Haida and Tlingit Indians of the southernmost part of Alaska.

DR. RAYMOND C. DODGE, Professor of Psychology in Wesleyan University, is Chairman of the Division of Anthropology and Psychology of the National Research Council for the year 1922–23.

MR. JOHN L. BAER, who recently contributed an article to the *Anthropologist* on bannerstones, has been continuing researches in the field along the same line.

MR. JOHN P. HARRINGTON, Ethnologist in the Bureau of American Ethnology, returned to Washington on July 6 after a most successful season among the tribal remnants of California.

PROFESSOR WILLIAM H. HOLMES and Dr. Aleš Hrdlička of the U. S. National Museum have been elected Honorary Associates of the Sociedad Cubana de Historia Natural "Felipe Poey" of Habana, Cuba.

COUNT BÉGOUEN has been named to succeed the late Emile Cartailhac as Professor of Anthropology in the University of Toulouse and Curator of Anthropology in the Natural History Museum.

DR. GEORGE P. DONEHOO, Secretary of the Pennsylvania Historical Commission, a student of the archaeology and ethnology of the state of Pennsylvania of long standing, has been appointed State Librarian and Director of the Pennsylvania State Museum.

MAY 1 Mr. Neil M. Judd, Curator of American Archaeology at the U. S. National Museum, left for New Mexico to resume direction of the Pueblo Bonito Expedition of the National Geographic Society; he returned to Washington late in September after a very successful season. During his absence Mr. John L. Baer served as Acting Curator of American Archaeology.

AT the second annual meeting of the Southwestern Division of the American Association for the Advancement of Science, held at the University of Arizona, Tucson, January 26–28, 1922, the following papers in Archaeology and Anthropology were presented:

Discovery of three skeletons of the Hohokam race in southern Arizona, a prehistoric desert people of the Southwest, by C. J. Sarle.

A prehistoric skull excavated near Tucson, by Robert F. Gilder.

Orientation of prehistoric house outlines near Bear Canyon, Tucson, Arizona, by H. B. Leonard and A. E. Douglass.

Yaqui ceremonial dances, by Mrs. Phebe Bogan.

Native American artists, by Edgar L. Hewett.

Life forms in the pottery decoration of the Pueblo area, by Kenneth M. Chapman.

Progress report in research in the Jemez region, by Wesley Bradfield.

Some archaeological studies in the neighborhood of Flagstaff, by L. F. Brady.

Under the section of History and Sociology R. E. Twitchell discussed "Pueblo land tenures in New Mexico and Arizona."

FROM an article in *Science* (March 17) it appears that from 1912 to 1921 inclusive 24 doctorates were conferred in Anthropology. The greatest number, six, was in 1915; in 1912 and 1919 there were none; in 1921 four.

DR. ALEŠ HRDLIČKA, Curator of Physical Anthropology in the U S. National Museum, is to serve the Children's Bureau of the U. S. Department of Labor in an advisory capacity on matters relating to the field of physical anthropology.

APRIL 25 Sir Arthur Keith began the second series of a course of lectures on "Anthropological Problems of the British Empire," the general subject of the series being "Racial Problems of Africa."

DR. ROLAND B. DIXON, Professor of Anthropology at Harvard University, has been elected an honorary member of the Chapter of Phi Beta Kappa in that institution.

AT the close of the last academic year Dr. John C. Merriam received the honorary degree of Doctor of Science from Yale and Princeton Universities, and the degree of Doctor of Laws from Wesleyan; Dr. Livingston Farrand received the degree of Doctor of Laws from Princeton; and Mr Vilhjalmur Stefansson the same degree from the University of Iowa.

DR. P. E. GODDARD of the American Museum of Natural History, accompanied by Lieutenant G. T. Emmons of Princeton, left New York early in June for the North Pacific Coast, with the object of collecting specimens and authentic data to make possible an early completion of the North Pacific Coast Hall in the Museum.

AT the thirty-sixth annual meeting of the Iowa Academy of Science, held at Drake University, Des Moines, April 28 and 29, two papers on American archaeology were presented: "The new Albin inscribed tablet," by Ellison Orr, and "Decorative markings on some fragments of Indian pottery from Mills County, Iowa," by Paul R. Rowe.

ON April 24 Dr. Malinowski began a course of eighteen lectures at the London School of Economics on "The Sociology and Economics of Some Island Communities." This course embodies the results of an intensive study of the culture of the Papuo-Melanesian communities around the eastern end of New Guinea of four years' duration.

EARL H. MORRIS, in company with Charles L. Parnheimer of New York City is making a general reconnaissance of the Navajo Mountain region of New Mexico.